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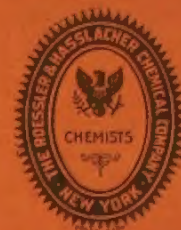
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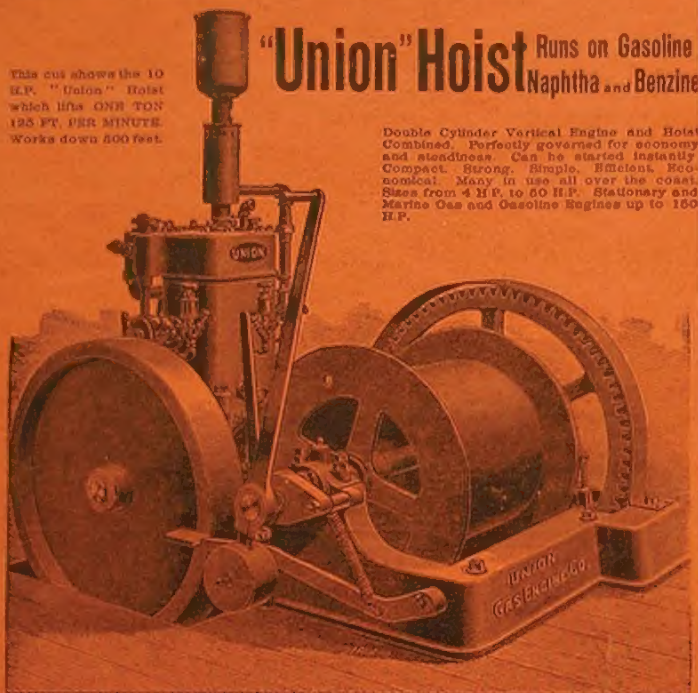
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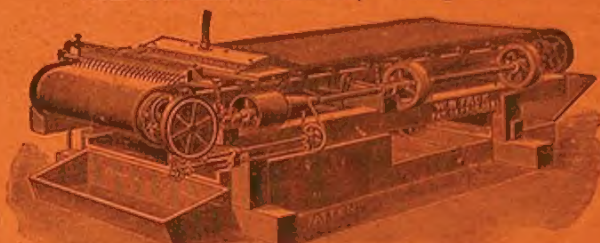
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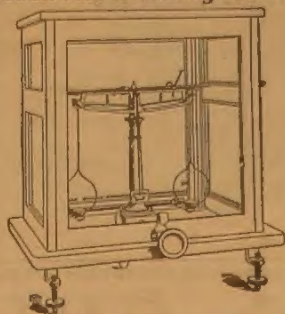
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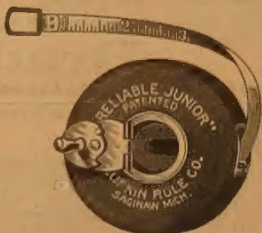
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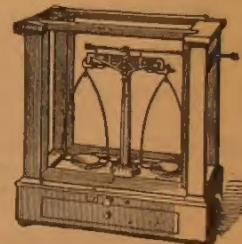
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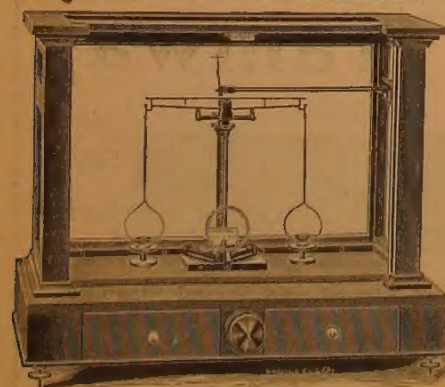
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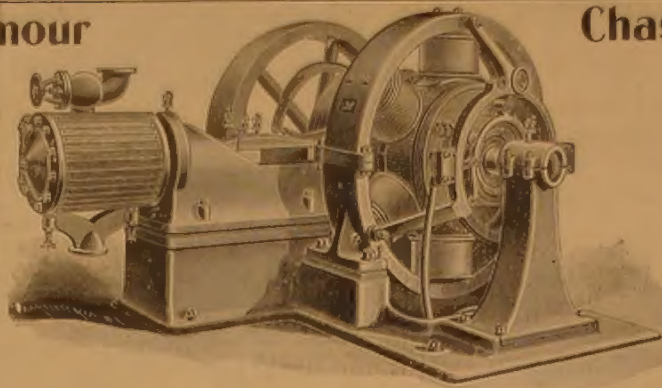
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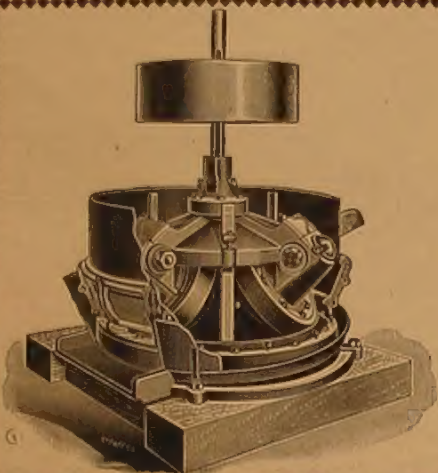
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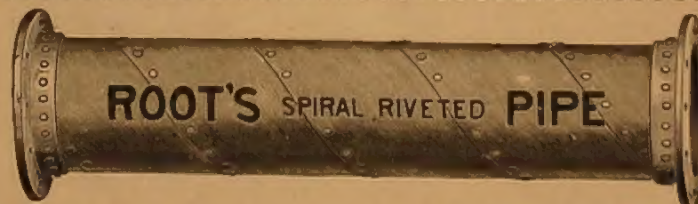


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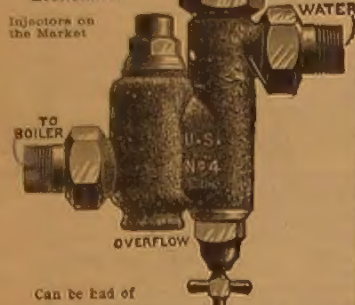


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Two Valuable Articles.

We are fortunate in being able to publish in this issue an article on "The Demand for Mining Tools in the Straits Settlements," by H. L. Geisel, whose interesting article on "Mining in Servia," in our December 1st issue, will be recalled by our readers. It is hoped that the present paper will be of service in pointing out a profitable field for American manufacturers of mining machinery who are looking for foreign markets.

A writer in Harper's Weekly recently described for the general reader the newly discovered zinc and lead fields of Northern Arkansas, and presented with it interesting half-tone illustrations of scenes in the district, which we reproduce in this issue in connection with Professor R. Craven Walton's article on the geological features of the district. The map we publish was prepared by Professor Walton from the results of his field work in the sections described.

Third Decade Changes.

With its next issue, this Journal will enter upon its Third Decade. Advantage will be taken of the occasion to inaugurate a few more or less radical changes. First of all, the title will be shortened to MINING AND METALLURGY, which it is hoped readers will regard as an improvement. The page will be reduced to the standard size of 9 x 12 inches, more than an additional number of pages being added to make up for the difference. The tendency of technical journalism is toward a smaller and standard page. One of the merits of the new size is that it will result in the paper reaching subscribers in better condition. There will also be a slight change in the color of the cover. Instead of terracotta, as formerly, the cover, though of the same general character, will be a little lighter in hue, which ought to give the periodical a brighter and more attractive appearance. Appropriately enough, the shade of the new cover is what is technically known in the paper trade as gold.

Michigan and Montana Copper Profits.

The Boston News Bureau, which always has an eye open for any combination of figures of interest to the copper world, has compiled tables showing the dividend payments of the leading Michigan and Montana copper mines for 1900. The fondness of the News Bureau's editor for copper statistics has inspired many valuable columns of figures of interest to owners of copper shares and to operators of copper mines. He now finds that only the usual small percentage of Lake Superior copper mines, the shares of which are listed in the Boston Stock Exchange, paid dividends in the present calendar year. On the list of mines considered, six have paid dividends this year against five in 1899. The total for this year is smaller than in 1899, owing to the decrease in the Calumet and Hecla output, caused by the disastrous fire of last spring. A noteworthy feature of the table is the amount paid this year by the Boston & Montana mine, which shows a disbursement in dividends of \$6,450,000 as against \$7,000,000 for the Calumet and Hecla. The latter, however, paid seventy-one per cent of the total made up by all the Lake Superior companies during the past twenty-two years.

A Successful Base-Measuring Apparatus.

A base-measuring apparatus which has been perfected in connection with the summer school work of the civil engineering department of the Massachusetts Institute of Technology for a few years has recently been tested by the Coast and Geodetic Survey in Washington. Such satis-

factory results have been already obtained and others assured that the apparatus is about to be used in the important Lampasas Base in Texas.

Professor Burton of the Institute, under whose direction the apparatus has been worked out, has been invited to accompany the expedition which is to make a careful trial of the method in the field and upon extended exact work.

The apparatus represents the final results of the investigations by several graduates of the course in civil engineering who have worked upon it in successive years. One part of the apparatus maintains a constant tension in the steel tape while in use. Another part of the apparatus determines very accurately the mean temperature of the tape by measuring its electrical resistance by means of a special form of thermophone devised by two graduates. The complete apparatus is not bulky and is considered to be of high value for exact measurements.

Mr. Hammond's Report.

In another column of this issue we publish Mr. John Hays Hammond's report in full, covering his examination of Stratton's Independence mine at Cripple Creek. Nothing that has occurred in the mining world in a long time has caused so much discussion as has this very report of Mr. Hammond. The meeting in London a few days ago of the Venture Corporation, the company which bought the mine from Mr. Stratton, appears to have been a most exciting and stormy one. The shareholders were evidently much disgusted with the whole matter, for after vigorously paying their respects to the directors, they passed a vote of no confidence in these eminent gentlemen. "Disgraceful" and "scandalous" were some of the terms applied to the conduct of the directors, who were accused of concealing for some time from the shareholders the condition of the mine.

Mr. Hammond, who has been in New York for a few days, was some little time ago, after his preliminary report, asked to take the position of consulting engineer of the mine. He stipulated that the shareholders must first be made acquainted with the condition of affairs at the mine as he found them, and this having been done, he has accepted the offer, and will hereafter act as technical adviser to the company. He says this will not prevent his going on with his other engagements or with expert work in South Africa or elsewhere. The connection with the company of a man of Mr. Hammond's reputation and ability will probably satisfy investors that whatever mistakes may have been made in the past, the work of the mine and the examinations and samplings of ore bodies will now be conducted in such a manner as to leave no room for further criticism. The shareholders of the mine are principally British.

The opinion among mining engineers in America is that the general public, in its ignorance of the conditions and technicalities of mining, may reach a conclusion regarding Mr. Thomas A. Rickard and his connection with Stratton's Independence unfair to that competent mining engineer and expert. Those who know Mr. Rickard—and he has a host of friends in the profession—still retain their confidence in both his ability and his integrity. They say that he may have made errors of judgment, and that the course pursued at Stratton's Independence may not have been the wise one in the long run, but they point out the injustice to Mr. Rickard of jumping at too hasty a conclusion regarding his methods—at least until his return to this country, and he has had an opportunity of presenting his own views on the subject. Mr. Rickard, by the way, is expected to return from London very soon now.

Stratton's Independence.

Full Text of John Hays Hammond's Report on the Condition of the Well-Known Cripple Creek Mine—Mr. Hammond Recommends a Reduction in Dividends to \$488,000.

John Hays Hammond, the eminent mining engineer, has been in New York for a few days, at the Waldorf-Astoria. We are now able to publish herewith Mr. Hammond's report on the condition of Stratton's Independence mine at Cripple Creek. This report, which is likely to become famous among mining records, is as follows:

Denver, Colo., Nov. 28, 1900.

The Chairman and Board of Directors Stratton's Independence, Limited, London, England.

Gentlemen—I cabled you on the 23d inst. the results of my examination of your property. It is exceedingly difficult to arrive at an approximation of the present ore reserves, on account of the lack of system in the mining operations during the last several months, but as the result of an extensive sampling of the property, I have cabled you to the effect that there are above the ninth level (lowest level of the mine) about 120,000 tons, having a gross value of \$2,300,000, and from which a net yield of \$1,000,000 will be obtained. This estimate is based on the condition of the mine on October 1, 1900, and it will take about a year to extract this ore. The accompanying longitudinal sections will show the stoped and unstopped portions of the three principal veins from which the bulk of the ore has been obtained, and within which the remaining ore reserves chiefly occur.

From these sections it will be seen that there remains a large extent of unstopped ground, but unfortunately, a considerable part of this ground is not payable, as is indicated by my estimate of the ore reserves. Mining operations have been confined to an area of about thirty acres in the northwestern portion of the property. This area lies within the recognized mineral belt within which the Portland and other large producing mines are situated.

The richness of this area is attested by the gross yield of \$8,250,000 extracted within a depth of 900 feet from the surface. The high grade of the ore is proved by the fact that about sixty-five per cent of the gross yield is estimated to have been profit. The richness of this belt is further evidenced by the large profits made by the Portland Gold Mining Co., whose property adjoins yours on the north. Within this belt good ore bodies occur, both in the andesite-breccia and granite. In addition to this area, your property includes eighty acres situated almost entirely outside the recognized mineral zone above referred to. The explorations thus far on your property and on that of the adjoining territory have failed to establish the existence of a belt of payable ore passing into the section embraced within the remaining eighty acres. Explorations in this region have, however, been totally inadequate to disprove the occurrence of payable ore bodies within the territory in question.

The unworked tract lies almost entirely within the granite area, and until recently a strong prejudice has existed among the miners of the district against granite as an ore-bearing country rock. The results of recent developments in the Cripple Creek District, however, have demonstrated the fallacy of this theory, inasmuch as some of the important producing mines now in operation lie within the granite area. This is a geological characteristic of more than academic interest, since the indications are that future exploitation upon your property, both laterally and in depth, will depend upon the discovery of payable ore bodies occurring in the granite formation.

To predict the existence of payable ore in de-

posits of this nature on geological data alone is not justifiable, but the results of my examination of the effect of lithological conditions on ore depositions in the Cripple Creek District lead me to believe that there is at least no evidence that granite as the country rock is per se an unfavorable geological feature. Moreover, the occurrence of pay shoots within the granite is proved in the Independence mine itself, though confined to that portion of the granite area situated within the recognized mineral belt previously referred to. From this fact it cannot be inferred, however, that the granite area outside of approved mineral belt likewise contains payable veins of ore. Nevertheless, I feel justified in advising you that the unworked tract in question is deserving of exploration, especially in view of the large area in which ore bodies of value may occur.

While it is true that the results of the present deepest developments have been disappointing in that the ore shoots have decreased in size and value, there is, nevertheless, a probability of a recurrence of good ore bodies with increase in depth of the workings. In mining districts poor zones and relatively poor zones frequently occur, and the contingency of such conditions should always be provided for by extensive developments in advance of exploitation. Unfortunately, in the case of your company, this important precaution has been neglected, and it is obviously extremely problematical at what depth the desired improvement in the veins will take place.

In the case of your mine there are, moreover, no indications upon which to base a prediction in this regard, especially as there are no developments upon any lower horizon in the vicinity of your mine.

I have stated in my cabled report that two policies are open to you:

First—The appropriation of all net earnings of the property for dividends, the consideration of the future of the property being subordinated to this end. The adoption of this policy would almost inevitably necessitate the stoppage of mining operations within a little more than a year, unless additional funds were provided.

Second—The reduction of dividends to the amount of \$488,000 and the expenditure of the balance of the net earnings to the vigorous development of your property.

I strongly recommend to you the adoption of the latter course, which, although the prospects cannot be stated more confidently than I have indicated in this report, is nevertheless justified, both from a mining and from a financial standpoint, especially when the past production of the property is considered. The future development contemplated by this course is the sinking of the main shaft to a further depth of at least 500 feet; lateral exploration below the rich area embraced within the thirty acres now worked, and explorations at an upper horizon in the remaining unprospected territory. The extent of explorations in the latter territory will be determined by the result of developments during the progress of the work. Very respectfully,

JOHN HAYS HAMMOND.

Mr. Hammond having been offered the position as consulting engineer, stipulated that he would not take the place until the stockholders had been informed of the conditions at the mine. This request was complied with, and Mr. Hammond has accepted the place, which will not, however, interfere with his engagements in South Africa or elsewhere.

According to reports current on this side of the Atlantic, there was no lack of confidence in this famous mine until October 1, or thereabouts, when the Venture Corporation, the promoters of the mine, found themselves in need of money. The

story is that when they bought out Mr. Stratton they obtained loans from the London banks, and that the obligations then incurred were approaching maturity. The Corporation thereupon offered options on a number of shares to London bankers at £3 a share in order to raise the money needed. At that time the shareholders supposed, trusting in the reports of their engineers, that they had \$13,000,000 worth of ore in sight, and that the bottom of the shaft was still in good ore. The directors also professed to hold the same opinion. The bankers were willing to take the shares, but they insisted as a precautionary measure that Mr. Hammond should examine the mine and submit a report upon it which must be favorable, of course, if they were to buy the shares. Mr. Hammond had had no previous connection with the Independence mine, notwithstanding the erroneous report that he had been concerned in its original sale to the English company. Mr. Hammond made his examination in October, as a result of which he cabled the company that the ore reserves had been greatly overestimated. The immediate effect of this message was a fall in the value of the shares from £3 to £1. Mr. Hammond, a few days after sending this despatch by cable, forwarded his formal report, already given in this article.

It seems that there is much history in the case aside from the meagre accounts that have been printed in newspapers; and after a reading of all that has been published, one does not wonder that the English stockholders have lost confidence in their directors.

In their report for the fourteen months succeeding the incorporation of the company and ending on June 30 of the current year, the directors say that the revenue account of the mine shows the sales of ore to have realized £705,762. A further amount of £10,104 was included for ore in stock, making a total of £715,866 as the gross value of the output for the fourteen months. After all expenses were deducted, the net amount available for dividends was £480,795, of which £400,002 represents the four quarterly dividends at the rate of forty per cent a year, paid to June 14 last. From the surplus which accrued to June 30 a final distribution of £66,667 was received by the shareholders on August 20, making a total of £466,669 paid in dividends for the first fourteen months' working. The directors' report seems to show that the anxiety of the London bankers as to the actual value of Independence shares was of later origin than that of the directors themselves, for they state that they had intended to hold the general meeting about the end of August; but, on the representation of some influential shareholders, they approached Mr. Hammond, who was then in America, with a view to his making an examination of the mine. Unfortunately he was, by the illness of a relative, prevented from proceeding with this at once, and sailed for England. On his arrival in London an offer was made to him of a seat on the board, owing to the vacancy created by the death of the late chairman. This offer, owing to his continuous absence from London, he was unable to accept; but entertained the suggestion that he should associate himself with the company as advisory engineer, it having been arranged between him and Mr. Rickard that the latter would then become general manager instead of consulting engineer. Mr. Hammond returned to America early in September, in the first place to examine another mine, so that his inspection of the Independence was not begun until October. In the meantime Mr. Shipman, the new manager, acting on instructions from Mr. Rickard, had begun a sampling of the workings, and discovered that the statements, as furnished by the late manager, and embodied in the monthly reports, were incorrect, and that, therefore, the ore reserves

were not as stated. He informed Mr. Rickard's representative, and he, in turn, told Mr. Hammond, who was about to commence his examination. These gentlemen decided to proceed with the sampling, and to acquaint Mr. Rickard with the facts on his arrival in Denver. Mr. Rickard learned the situation when he arrived on October 19, and he informed Mr. Baker, who was in America on business not connected with the company. On October 20 the directors received a cablegram from Mr. Rickard advising them from the results of the sampling then taking place that the valuation of the ore reserves made by him in the monthly reports, on the data furnished by the former manager, were seriously over-estimated. The directors assert that this was the first intimation that they had received that there was anything to indicate any change in the condition of the property.

On October 31 the above-mentioned cable was followed by another from Mr. F. W. Baker, an English stockholder then in America, giving further particulars as to the probable condition of

ately to carry out the recommendations of his report. The directors add that since the final distribution in respect of profits to end of June last an interim dividend, at the rate of forty per cent per annum, has been earned and paid for the quarter to September 30. A further interim dividend, this time at the rate of ten per cent per annum, in accordance with Mr. Hammond's recommendation, is proposed to be paid for the quarter to December 31, 1900.

The shareholders passed a vote of lack of confidence in the directors at a meeting of the company held in London on December 7. This meeting, according to the report of it cabled to the American daily papers, was marked by the wildest disorder. The course of the directors was characterized as scandalous and disgraceful. Mr. Rickard was present, and made a personal explanation. A long and animated discussion followed, during which language seems to have been used that was far from complimentary to the directors and others.

The Earl of Chesterfield, who presided, read a

A Colliery Banking and Screening Arrangement.

The colliery banking and screening arrangement of the Choppington colliery in Northumberland, about fifteen miles north of Newcastle-in-Tyne, England, which has attracted much attention among mining engineers, is described by Mr. John E. O. Keefe in a recent issue of the Journal of the British Society of Mining Students.

The erections are supported on cast-iron columns and rolled plate web girders, and enclosed, for the shelter of the workmen, with galvanized corrugated iron plates. The tub roads are arranged so that the tubs run by gravity from the cages over the weighing machine to the tipplers, and after being weighed and tipped, run round a curve to the foot of an incline, where they are caught by a creeper chain, and elevated to a point from which they run back behind the shaft. The tipplers are in line with each other on the one road, so that the first tub from each deck passes straight through the first tippler and on to the

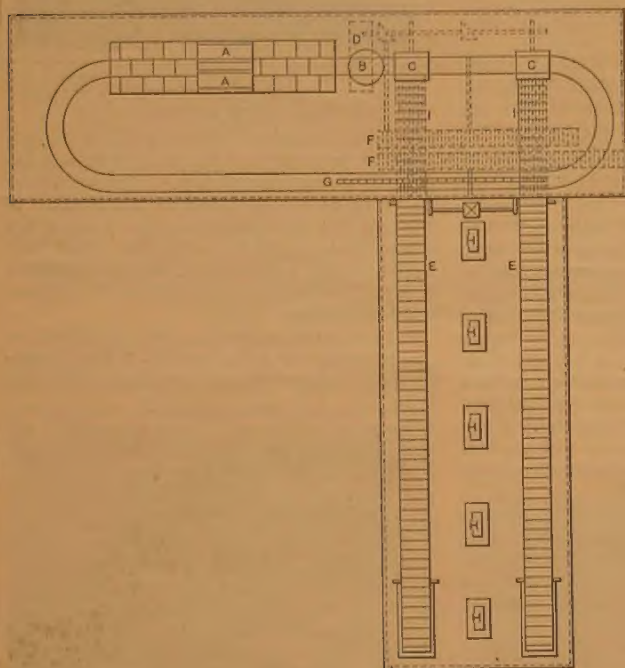


Fig. 1

THE BANKING AND SCREENING ARRANGEMENT, CHOPPINGTON COLLIERY.

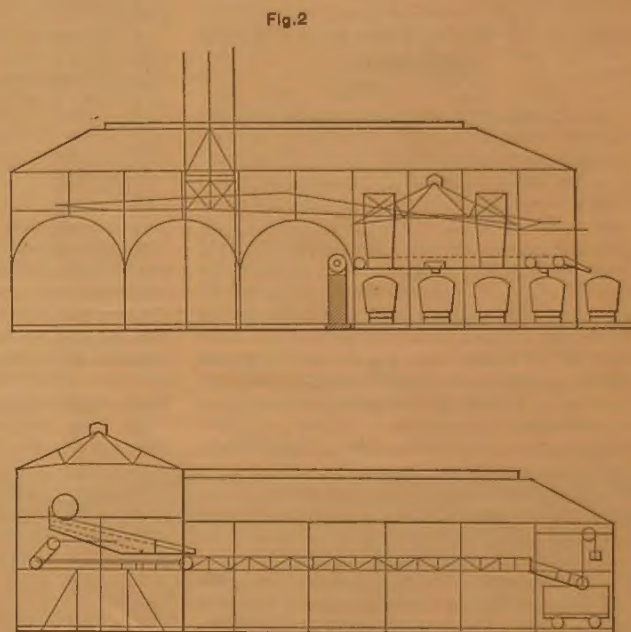


Fig. 2

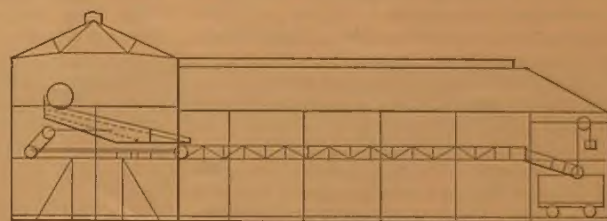


Fig. 3

Min. & Met. Journal, N.Y.

the ore reserves, as disclosed by the sampling, so far as it had proceeded. The cable was sent by him after consultation with the company's engineer. As a result of this cable the directors issued a circular on November 1. Mr. Baker and Mr. Rickard left immediately for London, and on their arrival the second circular, of November 17, was issued. Mr. Hammond's cabled report, received on the 24th, was immediately published in the London and provincial press, and communicated to the shareholders through the mail on the 26th. With reference to the 120,000 tons of ore mentioned in this report, the directors explain that crude or unsorted ore is referred to, while the production of the mine is always given in shipping ore. After careful consideration of Mr. Hammond's report, the directors came to the conclusion that he would not have recommended the expenditure of such a large proportion of the visible profits in new developments unless he believed in the future prospects of the mine. They have consequently cabled to Mr. Hammond, authorizing him to proceed immedi-

cably to carry out the recommendations of his report. The directors add that since the final distribution in respect of profits to end of June last an interim dividend, at the rate of forty per cent per annum, has been earned and paid for the quarter to September 30. A further interim dividend, this time at the rate of ten per cent per annum, in accordance with Mr. Hammond's recommendation, is proposed to be paid for the quarter to December 31, 1900.

The Boston News Bureau asserts that the most important item contributing to the present strength of the copper market is the great European demand for the metal. In face of the high price at which copper has been selling the past year or two, the domestic production has increased but little, while our exports have jumped ahead to record breaking figures.

second, pushing both empty tubs out before it. With this arrangement the tubs all travel in one direction along the same road, thus avoiding the use of switches, and the danger of the tubs meeting and causing a block, as is sometimes the case when the tipplers are on different roads.

Fig. 1 is a plan of the whole arrangement. The coal, on being discharged from the tub, falls on to a jiggling or shaking screen, with suitable meshes for separating the small from the round coal; the small passes through the meshes of the screen, and the round coal passes on to a cleaning belt, where all the stones, inferior coal, &c., are taken out, after which it passes over the belt end into the truck ready for the market. The small coal, on passing through the meshes of the first screen, drops on to another immediately beneath it, and is again divided into two classes, which are deposited on two conveying belts and carried to their respective trucks ready for the market. The cleaning belts for the round coal are hinged at a point about twelve feet back from the delivery end, and balanced with balance weights, so

that they can be lowered into the truck as may be required, to save the breakage of the coal, and raised as the truck fills up. The whole of the arrangements are driven by one engine, but the gearing is arranged so that in case anything happens to any part of the machinery the part affected may be put out of gear without stopping any other part, except, of course, the engine itself. The engine is fixed on a concrete pillar on the side of a truck road, brought up to the level of the belting stage, and stout cast-iron stays are fixed to concrete blocks below the jiggling screens, to stop the action of the machinery from setting up vibration in the structure. The locomotive shunts the trucks up into sidings above the pit, from which they are lowered by gravity in under the screens as they are required, and into sidings below the pit when they are loaded. A A, the cages; B, weighing machine; C C, tipplers; D, engine pillar; E E, round coal belts; F F, small coal belts; G, creeper chain; H, hoppers to lead stones and inferior coal into truck below; I, jiggling screens. Driving shafts and belts are shown by parallel lines. Figs. 2 and 3 are side elevations of the screens.

Demand for Mining Tools in the Straits Settlements.

By H. L. Geissel.

The demand for all kinds of mining tools, especially boring tools, in the Perak tin mining industry is very considerable. Up to the present time the bulk of these tools has been imported chiefly from Great Britain and Germany; it seems that so far no great attention has been paid by American manufacturers to the market offered to them for tools and machinery in the Straits Settlements. In 1898—the last year for which official statistical returns are available—the imports of machinery alone amounted in value to about \$400,000, of which only \$18,300 worth was of American origin. In the previous year, 1897, our machinery exports to the Straits amounted to about \$87,000; there was no falling off in requirements in 1898, as the imports from Great Britain, Australia, and Belgium largely increased, and the decline in our shipments can only be due to less strenuous efforts than those made in the preceding year.

It was only about ten years ago that improved boring tools were introduced into the Perak mining districts, but now even the more successful Chinese miners use them to prospect with. These tools are of several different patterns, but consist essentially of iron pipes, which are sunk into the ground, and various shaped implements which are employed to bring up the earth from inside the pipes, the object being to get a sample of the tin-bearing stratum without the trouble and expense of sinking a shaft. A complete set of boring tools is composed of the following articles:

Tubes. These are thin wrought iron pipes, usually in lengths of five and ten feet; their diameter varies from two and one-half inches to six inches. They are furnished with a screw thread at each end, so that they may be screwed into one continuous length.

Shoe and Driving Head. The shoe is a short length of iron pipe to screw on to the lower end of the tubes. It has a sharp steel cutting edge, to enable it to sink readily into the earth. The driving head is an iron collar to screw on to the top of the tubes, to protect the screw thread from being injured when working the rods inside the tubes.

Tube Tilters. Long handled clamps, which are made to grasp the outside of the tubes by means of a couple of clamping screws, and enable the pipes to be turned round, lifted or lowered. They are also employed in screwing the lengths together and opening them out again.

Tube Tongs. Like ordinary pipe tongs. They are useful for screwing and unscrewing the tubes, shoes, driving heads, etc.

Earth Auger. An implement very like the common wood auger on a large scale, but the cylinder is more closed in, so as to retain the earth. It is rather smaller than the internal diameter of the tubes with which it is to be used and its upper part is reduced to a square shank, and has a male screw for attachment to the boring rods.

Sand Pump. This is a length of iron pipe, the same diameter as the earth auger, fitted with a steel shoe at the lower end, and above it a valve opening upwards. Sometimes this is a hinge valve, and at others a ball valve. The top of the pipe is left open, and a shank is attached to it. This is also of square iron, and is at its lower part divided into a fork, and the arms of the fork are riveted to the top of the pipe.

Nose Shell. A combination of the earth auger and sand pump. It is a sand pump with a shot auger below the valve, instead of the shoe.

Sand Stirrers. These are like large flattened corkscrews, and their office is to loosen the ground in the hole and prepare it for the sand pump.

Chisels. There are many varieties of these. Those most useful are the flat, the T, the S, and the X chisels. They are all furnished, like the other tools, with square shanks and male screws.

Bell Trap. An implement to let down a hole to catch the top of a tool or rod which may have been dropped, and bring it up to the surface.

Spring Dart. An implement with an arrow-shaped head, used to recover tubes which have slipped down into a hole. The flukes are hinged, and have springs, which force them out when the instrument gets beneath the bottom of the tube. It has a male screw for attachment to the boring rods.

Boring Rods. These are the rods for operating the tools. They are of square iron, with enlarged joints, furnished with screws at both ends. They range from three-quarters to one and one-half inches in diameter, and are most convenient when in lengths of five and ten feet.

Rod Swivel. A short length of boring rod with a swivel bow at the upper end and a screw at the lower, to attach the rods to the hook from the pulley. It enables the rods and tools to be turned round while being worked up and down by the rope.

Rod Tilters are long-handled screw clamps, to revolve the rods in the hole, screw and unscrew them, etc.

Rod Keys. These are round, long-handled spanners, fitting the square rods and shanks of the tools. They have a point at one end which serves to turn the clamping screws of the rod tilters. They are used for turning, screwing and unscrewing the rods and tools and for handling them when in the hole.

Spring Hook. This is a hook with a spring catch, to prevent the rod swivel or rod hooks from slipping out of it. It is suspended from one end of the rope which hangs from the pulley on the sheer leg.

Pulley. A single sheave iron pulley, large enough to take a one and one-half inch diameter rope. It is hung at the apex of the sheer leg and the pipes, rods and tools are raised and lowered by its aid.

A spanner, to screw up the tube tilters, a small iron scoop to clear out the earth-auger, and an oil-can complete the outfit. In the larger sized sets a single or double purchase winch is required.

I may add that most of the foreign trade in tools and machines is transacted either at Singapore or at Penang. Both cities are the headquarters of large import merchants.

The Zinc and Lead Fields of Northern Arkansas.

By Prof. R. Craven Walton.

It is seldom that a section so large and rich, and fraught with such possibilities as the Northern Arkansas zinc and lead fields, has escaped the eye of the prospector and the capital of the investor for so long a time. The mineral belt of North Arkansas embraces the counties of Marion, Newton, Boone and Searcy. When a small amount of development work was done in this



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AN ORE MILL IN THE NORTHERN ARKANSAS ZINC FIELDS.

field several years ago, there was incredulity, because of its remoteness from railroads, and because no ore had been shipped. A few years later the White River was utilized for the shipment of the lead and zinc ores in barges. After a full smelter test the St. Louis and Carondelet companies and the Mineral Point, Wis., works offered \$2 a ton in excess of the price paid for ore from other zinc fields.

In these counties there are immense deposits of the following ores and minerals: I. Zinc group—(1) Sphalerite (zinc blende), (2) Smithsonite (car-



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A FACE OF ZINC ORE—NORTHERN ARKANSAS FIELDS.

bonate of zinc), (3) Calamine (silicate of zinc), and (4) Hydrozincite "Marionite." II. Lead group—(1) Galena and (2) Cerussite (carbonate of lead). III. Copper group—(1) Cuprite and (2) Malachite.

In addition to the above there are large deposits of kaolin, marble in various colors, onyx, alabaster, nitre and sand for glass making.

It is believed by many eminent geologists, min-

eralogists, and mining experts that this is the greatest zinc field in the world, the Joplin district not excepted, and all that is needed is the advent of railroads, so that the ore on the dumps and in sight can be placed on the market.

Beginning with the Ozark county, Mo., deposits there is a gradual change in the character and

Conservative estimates place the tonnage of ore along the survey of the St. Louis & North Arkansas Railway at the mines in Marion and Eastern Boone counties as 9,000 tons on the dumps and 50,000 tons in sight. The railway is graded to within three miles of Harrison and the work is being pushed as rapidly as possible. The Mis-

The Granite Rocks of Butte.

By Walter Harvey Weed.

(From the U. S. Geological Survey's *Journal of Geology*.)

In the western mountainous part of Montana there are several extensive areas of granite rocks, which are commonly surrounded by sedimentary beds and in part covered by later volcanic rocks. The largest of these granite masses forms a mountainous area having no commanding summits, but constituting the continental water parting separating the waters of the Atlantic from those tributary to the Pacific Ocean. This district is largely drained by the Boulder River, and as the mountains have no other name, they too are sometimes called by this name, for which reason it will be used to designate the intrusive mass of granite itself. Unmistakable evidences of intrusion are common about its borders, and as the rock cuts and metamorphoses fossiliferous carboniferous rocks and what are believed to be cretaceous rocks as well, and is overlaid by neocene sediments, its age is known within these limits.

The Boulder batholith is a body of granite rock, in part covered by later lavas, but continuously exposed from the Highland Mountains (sixteen miles south of Butte) to the vicinity of Helena, a distance of fifty miles in north and south direction and twenty-four miles from east to west. The intrusive nature of the mass is very strikingly shown at the northern and southern limits, and also at Elkhorn on the east. At these places the granitic rocks have produced very marked contact metamorphism, and cut across the ends of the upturned sedimentary series. Near its border the granite also includes in its mass fragments of the other rocks. There is no suggestion of a laccolithic uplifting, for although near Helena, and probably elsewhere, the granitic rocks extend outward under the sedimentary rocks, and the latter in certain places form a thin cover over the intrusion, yet the strata dip toward the intrusion conformable to a great anticlinal uplift wholly independent of the batholith.



THE NORTHERN ARKANSAS ZINC AND LEAD FIELDS

mode of occurrence of the ores as we pass to the southwest. The Ozark group of mines, up to the present, consists altogether of carbonates. Passing to the southwest into Marion, Boone, and Newton counties, Arkansas, we enter the great White River zinc field and the Buffalo River Invert, and in this field, while in the upper lens there is a large quantity of carbonate of zinc, zinc sulphides predominate. The accompanying map will offer a fair understanding of this region.

The zinc ores of the Northwest Arkansas field occur in the disseminated, brecciated, laminated and mass forms, both in limestone and flint. The heaviest deposits, however, are in the dolomite lime of the Silurian period. The minerals throughout these counties are exposed in many places; on the sides of the mountains and in the beds of the creeks.

The mountainside ore, however, is not a surface ore. It is an exposure of ore due to the process of erosion. Nature has done more mining in Northwest Arkansas than thousands of men could do in hundreds of years with the improved machinery of to-day at their command.

Much work has been done during the past year, but by far the most satisfactory has been in the way of deep mining and drilling. A number of shafts have been sunk to the depth of from sixty to one hundred feet, and all penetrate heavy bodies of blende (zinc sulphide) and some of these show paying qualities of galena. Among the representative shafts are the following: In Marion county—the Bear Hill, Clear Jack, Pilot Rock and Ruby in the Dodd City district; the Keystone and White River in the Jimmy's and Sister's creek districts and the White Eagle and Monte Cristo in the Rush group. In Newton county, the Panther Creek, Granby, Kansas City and Glory. Among the heavy-producing mines are the following: The Morning Star, Dyson, McIntosh, Red Cloud, Kalor, Bonanza and White River.

souri Pacific has its surveying corps in the field with a view of extending its line from Cushman via White River.

The government will rapidly convert the White



From Harper's Weekly

ENTRANCE TO A ZINC MINE NEAR BUFFALO CITY, ARKANSAS.

River into a possible water route, capable of navigation the year round. For that purpose Congress has appropriated \$1,600,000.

The rocks of this batholith present a wide variation in mineral and chemical composition, but a study of the field relations shows they must

be regarded not only as facies of the same magma, but as parts of one mass. The very basic rocks all occur at the margins, yet there are variations within the main body itself which are clearly recognizable rock types, yet cannot be discriminated in mapping. This difficulty has been experienced by those geologists working in the Sierra Nevada, where, as stated by Turner, a considerable variety of rock-types have been mapped as granodiorite, "although, as a rule, gabbro, even when genetically related to granodiorite proper, has been separated." Where detailed mapping upon a large scale map is not possible, this difficulty of separating parts of a single intrusive body in which the rock-types grade into one another can only be met by an arbitrary use of the name of the prevailing rock-type for the entire mass, as has commonly been done heretofore, or by using a generic term like granolite to embrace all coarsely granular rocks.

The prevailing rock of the batholith is a normal hornblende-granite which is very generally sheeted, forming picturesque crags and boulder groupings. It disintegrates readily into platy masses or shells which separate from the boulders, and themselves crumble to a coarse sand. Over large tracts disintegration has reduced the rock to a smoothly rolling surface, on which scattered boulders rise above the general level. Perfectly fresh material can, therefore, be obtained only where the rock has been quarried or exposed by mining operations. It is a medium to coarse-grained rock, the average size of the grains being 3-5 mm. The grayish quartz and white feldspar grains are of about equal size. Black mica and dark green hornblende are present in considerable quantity. Under the microscope it shows the normal characters of a granite, but contains an unusual amount of plagioclase.

THE BUTTE GRANITE.

The Butte granite (or quartz-monzonite) covers an area of several square miles and is the prevailing rock of the Butte district, and the one in which the world-famous copper and silver veins of that place occur. It is, therefore, of more than ordinary interest, and has been carefully investigated in connection with the study made of the general and economic geology of the district. It is a rather dark colored, coarsely granular rock which is seldom seen in conspicuous exposures about the productive mines owing to a close sheeting with much decomposition near the mineral veins and ready disintegration in other parts of the district. Away from the mineralized areas it is well sheeted and forms the usual boulder and castellated forms of such rocks. Its darker tone and greenish feldspars render it easily distinguished from the bowlder type. Throughout the entire district it is very uniform in appearance, as it proves upon analysis to be in composition, though differing somewhat in the relative proportions of the constituent minerals. It is also uniform in grain over the entire district, but hand specimens show in local patches a variation of textures. Inclusions of a much darker and finer-grained dioritic rock are often seen weathered in relief on exposed surfaces; they are always small, seldom over a few inches across, angular and rather scarce, never making an appreciable part of the mass. Owing to disintegration perfectly fresh specimens can only be obtained from surface quarries or underground workings. The exact relations of this mass to the general area were not satisfactorily determined, though it appears certain from the exposures that it is an integral part of the batholith and not a separate intrusion. At several localities a sharp gradation was observed, with narrow transition bands between the lighter colored granite with its white feldspars and the darker Butte type.

Orthoclase is an abundant and usually a readily

recognizable constituent, as its pinkish color is in contrast to the green tones of the plagioclase, and it has, moreover, a tendency to develop in relatively large crystals which give the rock a somewhat porphyritic look. Plagioclase, black hornblende, black biotite, and quartz are easily distinguished by the eye. Under the microscope the rock is seen to vary between a rather basic hornblende-granite and a quartz-diorite. There is usually a slight amount of chlorite present, but the biotite and hornblende are, as a rule, fresh. Titanite, apatite, iron ore and zircon are present as accessories. It will be seen that the rock is only a somewhat more basic phase of the granite of the region, and that it closely resembles granodiorite, though in the Butte rock the plagioclase is more basic, being a sodic labradorite.

THE BLUEBIRD APLITE.

Associated with the Butte granite there is an unusual development of aplite. So far as known to the writer it is the most extensive occurrence of granite aplite yet discovered. The largest mass is $1\frac{1}{4}$ miles by 2-16 miles, and is known from mine workings to be several hundred feet thick, resting on the Butte granite. Besides this large mass there is another of about one-third the size and numerous smaller bodies, as outlined by the author on the geologic map of the Butte district. In the cases hitherto observed by the writer, and those commonly described, aplices occur in dikes commonly quite narrow, but often of considerable length; such masses have been supposed to be the filling of cracks formed in the cooling granite, the aplite magma coming either from an acid residuum or nucleus of the mass or, as suggested by Turner, a product squeezed out of the crystallizing granite and gathered in cracks due to its shrinkage. A study of the Butte aplite shows that, though the dikes of this material may owe their origin to some such cause, that the irregular lense-like or meniscoid masses are sometimes local bodies unconnected with any feeder. The inference derived from a careful examination of many exposures is that the material is due to some such process as that suggested by Turner—a sort of segregation. In the description of the remarkable differentiation zone of Square Butte it was shown that the basic outer part of the intrusion, itself a product of differentiation, holds a thin band of white syenite due to further separation or differentiation of the feldspathic constituents in the crystallizing mass.

This hypothesis, my belief in which has been strengthened by further observations of other laccoliths in the same region, seems to explain the manner of occurrence of the aplices in the Butte mass. It is believed, upon evidence which cannot be presented here, that the Butte district is on the downthrown side of a fault and that its granitic rocks represent the upper part of the batholithic intrusion. In this uppermost part of the intrusion partial differentiation is believed to have taken place, the normal granite splitting up into the more basic phase represented by the Butte type and the acidic type, the Bluebird aplite. This hypothesis demands that as the Butte granite is but slightly more basic than the prevailing form, the proportion of aplite should be small. The field observations show a quantitative relation which, as far as it can be estimated, confirms the view.

This hypothesis implies a gathering of the iron, magnesian, and lime molecules out of the general magma and their concentration in the quartz-monzonite, with a separation out of the aplite material, richer in alumina, alkalis, and silica which did not form an inner kernel as it has in laccolithic differentiations, but local masses in the basic granite.

If the Butte granite is a border or upper contact facies of the batholith, this separation may have been induced by contact cooling. Observa-

tions of many of the smaller intrusive stocks of the Montana mountains and of the contacts of the larger batholiths show that there is more or less of a mixing of basic and siliceous materials as if they were stirred together while pasty. The rocks grade into one another and there are no sharp contacts.

In the large aplite intrusions there is no sharp band alteration. The grain continues the same in both rocks, but at a certain line there is a change in the relative proportions of the minerals. In the smaller bodies and little dikes the grain of the aplite is finer, though there is no contact band or evidence of chilling. In the Butte area this is uncommon. There is, it is true, a sharp contact between granite and aplite, but there are transition forms and even masses of granite in the larger aplite bodies which are clearly not included fragments but integral parts of the mass. Yet there is commonly a definite separation of the two rocks, and it is certain that there has been no mixing of the two materials due to convection or movement before consolidation.

In most of the aplite bodies the grain varies considerably from place to place; sometimes the rock becomes a micropegmatite, rarely a coarse pegmatite. There is sometimes a banding with alternations of fine and coarse-grained material.

The commonly accepted theory of the origin of aplite is that it represents the acid remainder in a granite or quartz-diorite magma after the more basic elements have crystallized. At a late period, after the main mass of the granitoid rock had crystallized, the aplite is forced up from below and fills previously formed cracks, which are perhaps the result of cooling. Viewed in this light they are genetically related to the more basic granites with which in the Sierra Nevada they are for the most part directly associated.

The Strong Copper Market.

For the first ten months of the current calendar year the production of copper in the United States amounted to 223,387 tons, an increase of less than four per cent over the same ten months of 1899, comparing with a normal yearly increase of ten per cent. During this period the exports of copper from this country amounted to 138,381 tons, an increase of fifty per cent over the same period last year. During these ten months we shipped abroad sixty-three per cent of our output.

The European production averages about 7,300 tons a month, and fluctuates little either way from this figure. It is noteworthy that in face of the strong copper market, the mines abroad are no more able to increase their output than are the American mines, as the European production for the first ten months of 1900 is actually the smallest for the same period since 1896.

These facts are naturally most gratifying to holders of stock in the big American copper properties. In another column we present a comparison of the dividend payments of the leading Michigan and Montana mines. Below is a table presenting the figures in greater detail. As usual the Calumet and Hecla maintains its lead by a margin which none of its rivals seem likely to overcome. The total dividends paid this year by the Lake Superior companies was \$9,978,000, and the total of the Montana mines was \$13,585,110. Following are the figures:

| | Per share | Dividends | Total |
|------------------|-----------------|-----------------|---------------------|
| | 1900 | in 1900 | paid to date |
| Calumet & Hecla | \$70.00 | \$100.00 | \$72,850,000 |
| Boston & Montana | 43.00 | 30.00 | 6,150,000 |
| Anaconda | 3.00 | 3.50 | 4,800,000 |
| Barot | 0.00 | 5.00 | 1,305,000 |
| Tamarack | 17.00 | 10.00 | 1,000,000 |
| Butte & Boston | 5.00 | ... | 1,000,000 |
| Quincy | 0.00 | 0.50 | 0,000,000 |
| Oreola | 0.00 | 0.00 | 558,000 |
| Wolverine | 4.00 | 3.50 | 210,000 |
| Atlantic | 2.00 | ... | 800,000 |
| Total | \$100.00 | \$173.00 | \$23,387,100 |

The Los Angeles-Salt Lake Railroad.

Articles of incorporation for the company which will build the proposed railroad from Salt Lake City, Utah, to Los Angeles, Cal., have been filed at Salt Lake City. Of the nominal capital of \$25,000,000, the sum of \$6,000,000 has been covered, it is said, by cash subscriptions. The corporate name of the company is the Los Angeles & Salt Lake Railway Co. Although the full details of the scheme have not been announced, and nothing has been made public in regard to the methods of financing the company, it is interesting to note, as Bradstreet's points out, that W. A. Clark, the Montana millionaire copper mine owner and candidate for the representation of that State in the National Senate, is the president of the new company, and that a number of prominent politicians and business men in both the East and West are associated with him in the directory and management. It is, however, also worthy of observation that among the names which figure in the list of directors are no representatives of any prominent railroad corporations, so that it is impossible to deduce anything directly from the personnel of the concern about its origin or affiliations with other companies. It is stated that the Los Angeles Terminal Railway, which has constructed about fifty miles of line in and about the city of Los Angeles, with wharfs and warehouses on the Pacific, is to be acquired, and will form part of the new system.

The total distance to be covered between Salt Lake City and Los Angeles is upward of 1,100 miles, so that the new road, if built, will be of no inconsiderable length. Considerable portions of the road, if the line is constructed as a direct route between the two points, would pass through sections of barren territory in southern Nevada, and there will also be a good deal of mountain work along the new line, although it is stated that the engineers who have made the preliminary surveys have discovered low-grade passes, and that it will compare favorably as to grades with the other railroads extending from the western slopes of the Rockies to the Pacific Coast. It will, however, naturally be several years before the road can be completed and become a factor in the transcontinental and Pacific Coast railroad problems.

The construction of a line from Salt Lake City to either San Francisco or Los Angeles is not altogether a new project. The Union Pacific already possesses, as part of its Oregon Short Line system, a line of road extending southward from Salt Lake to Frisco, Utah, a distance of several hundred miles, while a further extension of this road has been built to Uvada, near the southwestern corner of the State of Utah. It has frequently been suggested that this line might be extended so as to give the Union Pacific system an outlet to the Pacific Coast independent of its connection west of Ogden, Utah, with the Central Pacific and the other lines of the Southern Pacific system. Reports that such a move has been contemplated by the Union Pacific have, however, been uniformly denied, and at present the management of that company is to all appearances in such firm accord with the interests in control of Southern Pacific that it would be unlikely to undertake any new construction which would bring it into competition with the different railroad properties of the latter company. Some suggestions have been heard that the Los Angeles & Salt Lake Railway may represent a further extension of a system to be created out of the union of those natural allies, the Denver & Rio Grande and the Rio Grande Western, for the purpose of affording the two latter roads a direct and independent outlet on the Pacific Coast. It would, however, seem hardly probable that such an expensive piece of railroad building would be under-

taken unless the capitalists who stand sponsors for the new enterprise have the backing and are expected to turn the road, when completed, over to some of the larger systems, such as the Atchison or the Rock Island, which latter road, it has been long thought, was heading toward the Pacific Coast.

California Miners' Convention.

The California State Miners' Association held its ninth annual convention in San Francisco on November 19, 20 and 21. The meetings were of unusual interest and of much benefit to all present, and are likely to result in great good to the mining interests of California. The first session was opened with a message of welcome by the Mayor of the city. At the various sessions a number of important reports were read, among



E. C. VOORHIES

which should be mentioned that of John F. Davis from the committee on legislation; that of John M. Wright, from the committee on mineral lands; that of Thomas J. Barbour, from the committee on dredging and jetties, and that of Chairman Caminetti of the committee on dams and debris.

The sentiment of the convention and the purposes expressed by it are well embodied in the long series of resolutions, which were adopted



LEW E. AUBURY.

on the third day of the convention. The resolutions welcomed into fellowship with the association the members of the Petroleum Miners' Association and pledged them hearty co-operation. Appreciation was expressed for the efforts in the National Congress and California Legislature to pass the California Mineral Lands Bill, and Congress was urged to give favorable consideration to the bill. The executive committee of the association was instructed to test the constitutionality of the Caminetti law by defending a test case brought against a miner holding a license regularly issued by the California Debris Commission. The amendment to the revised statutes

of the United States concerning the location of mining claims so that the locator shall be accorded a reasonable time in which to mark his surface boundaries, etc., was endorsed. Much attention was given in the resolutions to the problem of remedying the abuses of the land and mining laws by wholesale attempts to secure as agricultural lands large tracts of public lands that are unquestionably mineral in character. The resolutions favored the proposition that where a contest takes place between a scripper and a miner, the burden of proof shall be placed upon the scripper. State legislation relative to the petroleum industry was favored, the demand for a Cabinet Department of Mines and Mining was endorsed, and a number of other resolutions were included in the list, among them one asking for an investigation of the State's water resources with suggestions as to the best methods of improving and developing them.

The proceedings closed with the following election of officers: President, E. C. Voorhies, Amador county; first vice-president, Fred Zeitler, Nevada county; second vice-president, Lew E. Aubury, Los Angeles county; secretary, E. H. Benjamin, Alameda county; treasurer, S. J. Hendy, San Francisco.

Activity in the Cinnabar Belt.

Dr. Wm. B. Phillips, the well-known mining expert, is making good progress in connection with the mineral survey of Texas, which he has undertaken on behalf of the University of that State. He will make his headquarters at Austin, Texas, though he is likely to be travelling through the State much of his time. In a private letter received from Dr. Phillips, he refers to the activity in the Cinnabar Belt in these words: "It is reported here, on what appears to be reliable authority, that 1,280 acres in the Cinnabar Belt sold recently for \$100,000. I know that there is considerable interest shown in that district. Two furnaces are already said to be in operation. The district is from 80 to 100 miles from rail, near the Rio Grande, south of Marfa and Alpine, stations on the Southern Pacific Railway, some 500 miles southeast of El Paso."

Copper in California.

A writer in the Boston News Bureau has directed public attention to the fact that although California has been explored for copper properties from north to south over a period of many years, the result of such exploration has not up to date placed California in the ranks of the important copper producing states. East of San Francisco a Mr. Harmon of Chicago has developed a small copper property at Camp Seco, and upon the present price for copper is understood to be making a little money. Twelve or thirteen miles from here the Ames estate of Boston has sunk a small fortune at a place called Copperopolis. Although this property has been under inspection and development for many years, no continuous bodies of copper ore have been found of sufficient size to warrant, upon an ordinary copper market, the erection of any plant, although if the present copper market continues this property holds a promising prospect. No work of consequence is being done upon it at the present time.

Another California copper prospect is in Shasta county at Copper City, and is known as the Bully Hill property of Mr. De La Mar. This is in a state of development and has no smelter or railroad as yet.

The only other copper property known in California is that of the Mountain Consolidated Co., Ltd., which is owned in England, and which is operating in Shasta county about ten miles west of the Bully Hill property. This company has the only developed copper mine of consequence in

California. It is paying dividends from a very handsome clute of copper ore found in an iron belt, but which copper chute is understood to be circumscribed and to have in part been bounded by the Mountain Consolidated Co. on all sides, so that it is perfectly well understood that the Mountain Consolidated Co. will cease to be a copper producer in a given time. It has been prospecting the country round about with options and diamond drills in hope of finding another copper ore body. About five miles from this property are two claims, known as Balakalala and the Shasta King. The Consolidated Co. investigated this region, took an option on the Balakalala, and after spending money upon it abandoned it. The Shasta King was inspected by the people now connected with the Amalgamated Copper Co., who could find nothing of copper value therein. It now, however, reappears as the Trinity Copper Co.

Last year the Shasta King was brought to Boston and offered for \$60,000. It was declined only to reappear again in another quarter at the price of \$75,000, at which price it was to have been taken over and floated, had not the parties interested been obliged at that time to look to their fences elsewhere.

It was finally sold to Thomas W. Lawson last December for \$125,000, or rather taken under option at this price, with an agreement to spend \$2,000 per month in development work. A few weeks ago Mr. Lawson made his final payment and completed the purchase, making the sum total of the cost of the property and development work not more than \$150,000. It is now offered for public subscription as the Trinity Copper Co. on the basis of \$6,000,000.

New Discovery of Coal in Central Asia.

A Russian contemporary is responsible for the statement that large deposits of bituminous coal have recently been discovered in the immediate neighborhood of Utsch-Kurgan, about thirty-two versts (21.2 miles) from the station of New-Magelhan. It is reported that the field covers an area of about twenty-five square miles and that the coal is of first class quality and better than the Donetz coal. A company, chiefly composed of French capitalists, has been formed for the purpose of exploiting the deposits, and it is said that the Russian Government is supporting the new organization in every respect. It is said that the Government even went so far as to give binding assurances to the company to the effect that the coal would be used on the Government railway lines in Transcaspiia, in place of the petroleum fuel now used. The military authorities have already placed an order for 800,000 poods (12,000 tons) of this coal. The production, we are further informed, is to be regulated according to requirements, though the new company hopes to be able to ship its coal as far up as to the Volga river. There is little doubt that some day Central Asia will become a valuable coal market itself, especially if Russia continues to push on its railway extensions at such a feverish speed as has been the case during the last few years. The services of 4,000 Kirghese have already been secured, and work on a large scale will soon be started. The Kirghese of the Andidjan steppes are said to be willing and good laborers, and will work at from thirty to forty copecks (15.5 to twenty-one cents) a day.

New-Magelhan, where the deposits are said to be situated, lies between Turkestan and East Turkestan, to the northeast of Bokhara. The Transcaspiian railway is now in operation as far as Samarkand, whilst the extension from Samarkand to Uratube and further north is under way of construction, so that proper means of transportation for the coal will soon be available.

Mining in Queensland.

The Hon. Robert Philip, premier and treasurer of Queensland, has authorized the publication of the following report on mining in Queensland:

GOLD.

Last year's gold yield was the largest yet recorded, aggregating nearly 1,000,000 ounces—exceeding that of the preceding year by 27,000 ounces—and the yield of the current year bids fair to eclipse that of its predecessor. On all our principal fields the mines continue to give a large and regular output, and both at Charters Towers and at Gympie the exploration of the deeper ground has been in the highest degree encouraging. While Charters Towers last year produced 50,000 ounces in excess of the preceding year, Gympie shows a falling off of 16,000 ounces, but the past year on the latter field has been one of remarkable mining activity, and already during the current year the fruits of this activity and energy are apparent in a larger yield and increased dividends. Mount Morgan again affords an object lesson of the results that can be obtained by the application of scientific methods to the extraction and reduction of large bodies of comparatively low-grade ore. Last year the mine produced 172,339 ounces of gold of a value of £763,449, the average yield per ton being a little less than 15 dwts. The remarkable yields of some of the mines at Croydon, one of which alone has, during the past twelve months, produced gold of a value of £97,000, has attracted considerable attention to that field, and strenuous efforts are being made to test the ground at a greater depth than has hitherto been attempted. At Ravenswood also a feeling of confidence is apparent, which would appear to be justified by the favorable developments in several of the mines there. Even in what have been termed our "neglected fields" some interest has been awakened, and the Hodgkinson, Coen, and Palmer have all received attention from speculators and investors, while the discovery of the Hamilton, which within the short period of its existence has been credited with the production of 10,000 ounces of gold, shows that there is still scope for the prospector in the little known watersheds of the Peninsula. The success of dredging operations in the neighboring colonies has caused many miles of our rivers and creeks to be appropriated with the view of testing them by this, the latest method of gold mining. Experts from the neighboring colonies who have visited some of the proposed scenes of operations have expressed themselves favorably respecting the prospects of success, and before the close of the current year at least three, if not more, dredges will actually be at work.

SILVER.

Of minerals other than gold the actual production has been small, and gives little idea of the latent wealth of the colony. Thus the total yield of silver, 145,000 ounces, valued at £15,000, came from two small mines, one in the Stanthope and the other in the Ravenswood district. But the galena lodes of the Burketown mineral field are shown by the recently published report by Mr. Cameron of the geological survey staff to be well worthy of the trial which they will no doubt receive when reasonable means of carriage to the coast are provided.

TIN.

Thirteen hundred tons of tin, valued at £77,000, represent the year's production of that metal, but a great expansion of this industry may certainly be looked for. The tin-bearing area of Queensland is larger than that of any other of the Australian colonies; new ground is being constantly opened up, and many of the old mines have passed into the hands of those who are willing and able to work them in the only manner in which they can be worked profitably.

COPPER.

Copper latterly, more than any other mineral—not even excepting gold—has attracted attention to the mining possibilities of the colony. That we possess many valuable copper mines is beyond question, and should surprise be expressed that the production is at present so small, it may be well to remember that the opening of a copper mine is a laborious and costly undertaking. But now at any time we may hear that the furnaces at Mount Garnet have commenced smelting, and it is confidently hoped that by January 1 next six furnaces will have been erected at Chillagoe, capable of treating between 3,000 and 4,000 tons of ore a week. At the Elnasleigh Copper Mine the manager, who is raising 100 tons of ore a week, hopes to begin smelting operations before the end of the present year, and at the Mount Chalmers and other mines in the Rockhampton district the furnaces now being erected will soon be at work. Such development work as is being done in the mines at Cloncurry confirms the belief in the richness of that district; and this is also true of the large ore bodies at Glassford Creek, in the Gladstone district, but nothing can be hoped for from either of these fields until railway communication with the coast has been established.

COAL.

Last year's production of coal was 494,000 tons, being an increase of 80,000 tons over that of the preceding year. Hitherto the consumption of our coal has been purely local; indeed, our mines have been unable to supply our requirements, the reason being the remoteness of our coal beds from water carriage. The increased demand for coal all over the world has no doubt been the cause of attention being again directed to the great stores of this article that the colony possesses, and it seems probable that an effort will be made, not only to supply all our own wants, but to look for markets outside our boundaries. Mr. Dunstan, an officer of the Geological Survey staff, estimates that within the area of the Blair Athol coal field—about five square miles—there are 7,000,000 tons of the finest quality of Clarmont coal, and about 56,000,000 tons of a slightly inferior quality in a lower seam not yet mined, irrespective of other seams that may exist at greater depths. A remarkable discovery of anthracite coal was lately reported to have been made on the Dawson river. The seam is eleven feet thick, and the coal is very heavy and compact. As the coal country extends westerly from the Dawson for many miles, the quantity of anthracite is enormous. No other coal of the same character has been found in Australia, so that the deposit will be a very material factor in metallurgical operations within the colonies, and may become of international importance.

As to Collide creek, situated about fifty miles in a southwesterly direction from Gladstone, so long ago as 1892 Mr. Rends, then assistant government geologist, reported that over the area already proved there was sufficient coal to last for 150 years with an equal output to that of the whole colony for that year—namely, 338,334 tons. If the owners can get permission from Parliament to build a railway to deep water, I understand that an influential English syndicate will be formed to supply them with the necessary funds to construct the railway and develop the mines.

WOLFRAM.

Of the rarer minerals the colony appears to have a fair share. Wolfram especially is abundant and of high quality, and last year the wolfram mines of the Hodgkinson field yielded 250 tons, valued at £10,000.

OPAL.

Although gems and precious stones of various kinds are known to exist in the colony, the search

is practically confined to opal, which appears to be widely distributed over the western portion of the colony. It is difficult to obtain accurate information, but it is estimated that last year the value of the stone sold was £9,000.

A review of the year's operations, necessarily brief and cursory as this is, abundantly shows that mining in Queensland is fast assuming the proportions of a great industry, with infinite possibilities of expansion; and it requires no great prescience to foretell that ere long this colony will rank first among the mineral producing colonies of Australia.

Utilizing Furnace Gas in Germany.

Twenty-five representatives of the largest iron works in France and Belgium recently inspected the electrical central station of the Horde Mining & Rolling Mills Association at Horde, near Dortmund, Prussia, to study the arrangement there for utilizing the gas coming from the mouths of furnaces. This plant and its method are considered among the wonders of modern technique. When fully completed, the plant will have a force of 6,100-H.P. Three twin motors of the Oechelhauser system are now run by these furnace companies, and produce an electric current for supplying power and light for the Hermann rolling mills. Four motors of 660-H.P. and four others of 1,000-H.P. each are now in process of construction to serve like purposes.

A Case of Mine Salting in Australia.

That mine salting is not yet by any means an obsolete art is shown by a report published in the Australian Mining Standard, of the fate of three young men who were detected in "doctoring" a consignment of ore with the purpose of falsifying the assay returns. The Standard tells of the case in the following words:

It cannot be said that well-merited punishment has been meted out to the three young men, Llewellyn Radcliffe, Joseph Radcliffe (brothers), and Benjamin Morgan, found guilty at the recent criminal sittings of the Ballarat Supreme Court of "salting" a trial crushing from the Glenfue No. 1 Gold Mining Co., Pitfield, and which was treated at the Ballarat School of Mines. The story of the affair is fresh in the memory of readers. A trial crushing was taken out of the mine, and while the material was being carted to the School of Mines, the accused who, after failing to get Glenfue gold, had purchased some alluvial gold from a Chinaman for the purpose, placed it in the stone. The return gave 1 oz. 6 dwt. from 27 cwt. As it was believed that the stone had been tampered with, a crushing of ten tons was tried, and the result aggregated 5 dwt. 12 gr. The accused had traded fairly extensively with the shares in the company, and through the first yield netted a profit of about £200. When the accused came up for sentence evidence of previous good character was accepted by Mr. Justice A'Beckett, and he awarded Llewellyn Radcliffe twelve months' imprisonment, and Joseph Radcliffe and Benjamin Morgan six months' imprisonment. The accused are to serve the terms in the Castlemaine Jail, which is used for the first offenders. In mining circles it is considered that the sentences are wholly inadequate in proportion to the offense. Mine salting is probably considered by the mining world to be a most heinous offence, and if the industry is to be kept pure such practices must be put down with a firm hand, so that the punishment may act as a deterrent to others. To inflict such nominal penalties is to practically defeat this purpose, and as the honor of the representatives of the mine, the officials at the School of Mines, and sharebrokers in general, had been assailed the dissatisfaction with the result of the trial is widespread.

Progress in Coal Mining.

A Century's Improvements in Machinery and Methods—A Look at the Future The Present's Greatest Need—Men Who are Masters of Their Business.

By Fred. C. Kelghley.

I have not been able to ascertain when the first engine was used at the mines for pumping, neither have I been able to learn when coal was first hoisted by steam, but I am safe in saying that it was prior to 1800, for Boulton and Watt were making engines in 1774 and the first Watt engine was built to replace a Newcomen at the Cornwall copper mines. I must mention the great man engine used to hoist men out of the mines. This engine was a large beam reaching from the surface to the bottom of the shaft with steps fixed upon it at measured intervals, and along the side of the beam a series of platforms was erected, also at measured intervals. As the beam was lifted up and down by the engine on the surface the men stepped from step to platform and vice versa until they were bobbed out at the top of the shaft. There was later an improvement on this single-rod man engine by adding another beam, making what was termed a double-rod man engine. In this case the men stepped sideways from rod to rod, fixed platforms not being necessary. These rods lifted the men at the rate of seventy-two feet a minute. Before the adoption of these rods the men were required to climb out of the shafts by ladders.

For ventilation they first had what we still frequently see even in this progressive and aggressive land of ours—the much relied upon forces of nature termed natural ventilations. Then came the air collar—a box or series of boxes carried under the road, the fresh air working in along the coal floor and the heated air returning in the passage way. The cowl or cap head and kindred contrivances followed, as did the water trompe, an arrangement by which air is carried down into the mines by means of a current of water falling down a box; the fire basket; the plain furnace and the elaborate double-arch furnace with side spaces and dumb drift; the steam jet and compressed air jet; the cage ventilator, the steam displacement machine with its aerometers and walking beams; the fan machine with its wheels and epicycloidal teeth; the Lamielle six-sided drum; the Cook ventilator with its eccentric, cylindrical drums, and the Root rotary air compressing machine. The centrifugal ventilators followed of the Nasmyth, Blram, Rammel, Waddle, Schiele and Gibal types, with their straight radial blades, straight inclined blades and the curved blades. And last of all came the great Capel fan with Wm. Clifford in the background. He had better keep his eye out for the duplex Murphy whom I had nearly forgotten. Pitmy informs us that the earliest means used for renewing the air in mines was by diligently shaking a piece of cloth at the entrance of the mine. Fans and air pumps were in general use in Agricola's time and are described at length by that author. Some of these appliances were capable of keeping passages a quarter of a mile long clear of foul air, so the ancients were not so slow as some of our natural ventilators of to-day.

OLD METHODS OF DRAINAGE

As to drainage, the first means of disposing of water was by the adit or drift, and that was in all probability followed by the baler, barrel and pipe, water box and siphon. The elevator buckets followed, then the beat pump, horse pump, walking-beam pump, the direct acting steam pump and the air compressor.

The underground haulage was first by baskets, next by sledges, then trams, and finally the pit wagon of the present day. The sledges and trams were pushed and pulled by hand. These were

in turn replaced by the pony, horse or mule; the gravity plane, the endless chain, the endless rope, the tail rope, the steam locomotive, the electric motor, the low pressure compressed air locomotive, and finally the high pressure compressed air locomotive, working under a pressure of 500 pounds to the square inch. The pick and sledge, the churn drill, the percussion drill and the wedge and bar are being rapidly replaced by the rope driving mining machine, the compressed air and the electric mining machine of the percussion, rotary bar and chain types. The canvas curtain and the wood trap door are rapidly being displaced by the overcast and the automatic trap door.

The tallow candle, the steel mill, the oil lamp and the tin can Stephenson safety lamp have given way to the Davy, the Clanny, the Marsant and the Wolf lamp with its ignitor and magnetic lock. The electric light has taken the place of other lights for fixed illumination. In the engineering department we find the ancient compass in its various forms, viz.: box, hanging, Jacob's staff or tripod, replaced by the engineer's transit, Y-level and steel tape. The former haphazard custom of driving headings anywhere and on any course is replaced by those run on given courses with the object of achieving certain expected results; and at some mines these expected results are being gotten. The tendency now is to try and get out all the coal that can be gotten out at profit not of to-day, or this month, but with reference to the whole term of the mining operations.

THE "ALL AROUND MAN."

Until very recently the future was never considered at all, and the man that could make a splurge was the man that was looked for. Now this is all changed, and if a man makes a phenomenal showing it is investigated to see if it is not at the expense of the future operations. When I was a boy, the man that had charge of a coal mine had to be a Jack-of-all-trades. He not only was supposed to be capable of conducting the operations, but to be able to make a survey of his mine, to be able to look after the accounts, and if necessary erect the engines, pumps, boilers, etc. This question of engineering brings to my mind a remarkable piece of engineering work that was performed near Newcastle, Pa., when I was a small boy.

Charles Herbert, a well-known mining superintendent now dead, had charge of a mine, and an air shaft was needed there. In order to locate that shaft on the surface over that part of the mine workings selected for its site, a survey was necessary, and this is the way the survey was made: An old box compass was procured from some obscure source and taken to the mine, where it was carefully laid on the ground midway between selected points, and carefully levelled up with slack and coal dust, then a string was stretched from point to point across the dial plate and note made of the number of degrees the string cut. This operation was carried on course after course until the survey was completed. I have been assured by people whose veracity cannot be impeached, that the survey proved to be fairly correct. Of course the operations underground were repeated on the surface.

This is now all changed, and a man is no longer valued for the number of things he can do, but for the one particular branch he is an expert at.

Just when the present advanced systems of methods of mining were first put in practice I cannot learn; in fact, I believe no one really does know, but I am inclined to think that the coal mine officials of a century or more ago were not so ignorant as present popular opinion has it. Very large quantities of coal were mined several centuries ago, and under the most adverse conditions, too, so they necessarily had considerable

skill and knowledge as well as system employed. Many, if not all of the present plans of mining were known and in practice when I was a boy (though perhaps not in the United States) and in proof of this I will refer you to "Hopton's Conversation between Father and Son," published in 1864. The plans of working given there are as fully advanced as any of the present day, yet they must have been in use years before that or they would not have been published. In fact, they are given as plans in use. In this connection I will say that only within the present year I have noticed an application filed for a patent on the six-heading system of opening up mines, yet that system has been in use to my knowledge for nearly ten years at the Oliver mines, and possibly it was used somewhere years before then. Every little while some one draws attention to some new plan for working coal, but when I turn to such works as Hopton, Pameley, Wardel and others, I find that they are not new after all. In fact, I believe that so far as the general planning of the workings of a coal mine is concerned, the highest point has been already achieved, though I am ready to admit that there will be improvements in the detail work about the shaft bottoms and in the arrangement of the machinery.

THE GREAT NEED OF TO-DAY.

What is required now is a more thorough and effectual execution of the plans we have already formulated. There will doubtless be improvement in the lighting of the mines; in the coal-cutting machinery; in the pumping machinery; in the systems of haulage and in the various appliances; there will be deeper shafts and larger outputs; greater problems to solve, but I look for the greatest improvement to take place in the official force. There will be more of these employed in the future, and each man will be a specialist in his particular line. We are not needing improved plans, improved machinery, improved appliances, so much as we are needing a higher grade of labor; a greater degree of skill; men that are not only masters of their profession, but men that are loyal and true. Men that are to take positions about the mines in the future should be, and doubtless will be, first selected for their special qualities and trained for the position they are to fill. It is in this way, and this way only, that the future mining operations can expect to surpass those of the present day.

The one great cry from the mining industry, and the same is true of every industry and profession of this mighty nation, is not for things; not for ways; not for means; not for opportunities, but for men that are masters of their business; men tried and true; men of the stamp of the man who carried McKinley's message to Garcia. There never was, there never is, and there never will be danger of an overplus of that kind of men.

Coinage for November.

Coinage executed at the mints of the United States during the month of November was as follows:

| Denomination. | Pieces. | Value. |
|---------------------------|-------------------|---------------------|
| Double eagle..... | 633,000 | \$12,660,000 |
| Half eagle..... | 105,000 | 525,000 |
| Total gold..... | 738,000 | \$13,185,000 |
| Silver dollars..... | 2,462,000 | 2,462,000 |
| Half dollars..... | 912,000 | 456,000 |
| Quarter dollars..... | 600,000 | 150,000 |
| Dimes..... | 620,000 | 62,000 |
| Total silver..... | 4,594,000 | \$3,130,000 |
| Five-cent nickels..... | 3,518,000 | \$175,900 |
| One-cent bronze..... | 5,422,000 | 54,220 |
| Total minor..... | 8,940,000 | \$230,120 |
| Total coinage..... | 14,272,000 | \$16,545,120 |

The Origin of Coal.

A Fellow of the Geological Society has contributed to the Colliery Guardian of London a valuable paper summarizing a number of opinions on the formation of coal. He writes as follows:

While the public have been sorrowing and the coalowners rejoicing in the high price of coal; while the alarmist has been prophesying the untimely exhaustion of English coalfields, the geologist and the botanist, meeting together on common ground, careless of everything but the search after truth, are discussing the origin of the black mineral to which we owe so much. At the recent meeting of the British Association the two sections which espouse the cause of botany and geology respectively, met together to discuss the origin of a natural substance with regard to which theories are as numerous as the grains of sand on the seashore. What more competent tribunal could be appointed for the purpose? The botanists brought to the discussion faculties trained to observe the habits of modern plants and the climatic conditions under which they grow and flourish; the geologists brought evidence of geological phenomena deduced according to the principles laid down by Sir Charles Lyell, from close examination of the movements of earth, air and sea; and although some of the learned authors who read papers differed widely in opinion, much light has been thrown upon the subject with regard to which they were asked to pronounce judgment.

What, then, is the nature of this problem? What are the admitted facts concerning coal? It is a substance of vegetable origin. The fossils which are found within it, and its chemical composition both point unhesitatingly to that conclusion. It came into existence many millions (for a geologist always hesitates to mention periods of time) years ago. Long before the London clay, the chalk which builds the white walls of the south coast—nay, long before the Jurassic Alps came into existence—this vast world-wide accumulation of vegetable matter had been formed by agencies the nature of which can only be the subject-matter of conjecture. Of the many theories still extant as to the conditions under which coal was formed, two have forced themselves into prominent notice. The first of these is the "growth-in-place theory." It is asserted by those who advocate this theory that after the deposition of the millstone grit in Yorkshire (commonly known by miners as the Farewell rock), the whole of Northern Europe became a vast swamp, in which countless trees, unlike the giants of our modern forests, but closely akin to tiny plants still living on the earth, grew and flourished in large numbers. The gradual decay of these forests was accompanied by a slow and uniform depression of the earth's surface; floods from great rivers rushing into the swamps from adjoining land occasionally deposited stones and silt upon the masses of decaying vegetation, with the result that the beds of coal with which we are now familiar became interstratified with beds of fire-clay. Such is the "growth-in-place" theory. Upholders of the "drift" theory are of opinion that coal was formed by masses of vegetation being carried out from the land by powerful rivers to a distance far beyond that reached by the silt held in suspension in the water. Reaching quiet regions far from land, these flotillas of vegetation became water-logged and sank to the depths of the ocean, there to be consolidated into coal.

The theory put forward at Bradford by Mr. Strahan, of the Geological Survey, is a compromise between these two hypotheses. Close study of the coal formations in this country has led him to the belief that although the material which became coal was deposited on or near the land,

the evidence is not conclusive that the forests gave rise to coal seams in the place of their growth. In support of this he mentions the interesting fact that while trunks of trees are found in the underlying sandstone, they are not found in the coal itself. He suggests that the general sequence of events preceding the deposition of a normal coal seam was (1) the outspreading of sand or gravel with drifted plant remains, followed by shale as the currents lost velocity, (2) the gradual retreat of the water, leaving the surface open to the air, (3) the deposition of very fine sediments, (4) the rooting of a mass of vegetation in the deposit so formed in which mass were caught wind-born vegetable dust and floating vegetation. The formation of a coal seam was brought to a close by the influx of rapidly-flowing water. In answer to this interesting theory, Professor Kendall brought forward an argument which has always been raised in favor of the growth-in-place theory—namely, the extraordinary uniformity of coal both in thickness and quality over widespread areas. He also stated that in many coals no trace of aquatic animals can be found, although canal coal yields abundance of fish remains, shells, and minute crustacea.

The theory put forward by Mr. Strahan is plausible enough, and may serve to explain characteristics which, although not of universal occurrence, are frequently observed in the coal measures. His view, moreover, is founded upon no extravagant or cataclysmal hypotheses which sometimes lend improbability to the conclusions of the most experienced geologists. He is ably supported by Mr. Seward, who, after careful investigation of the microscopic structure of the plants found in the coal measures, has come to the conclusion that the seams were not the result of growth in one place, nor of drifting, but of the accumulation of vegetable debris derived chiefly from plants growing on the surface of large lakes and pools near to the borders, where they died and were carried out by gently flowing water and sank to the bottom over the whole water area. Nor is Mr. Seward content to say that the coal-measure plants were necessarily the denizens of marshy land. He asserts that *Sphenophyllum*, a well-known coal measure fern which has hitherto been regarded as aquatic, was in reality a climbing plant. The accompanying photograph of *Sphenophyllum majus*, from the middle coal measures at Barnsley, shows the shape of the leaves of this plant. He also stated that there may have been a palaeozoic mountain flora of which no records have been preserved. When so much is uncertain in the history of the earth it is at least allowable to make suggestions of this kind.

Perhaps the most interesting paper at this important meeting was that read by Dr. Horace Brown, F. R. S., in which he describes the result of certain experiments at Kew with regard to the growth of plants in an atmosphere supercharged with carbonic acid. As an explanation of the extraordinarily prolific vegetation in the carboniferous period, it has often been suggested that the air was charged with an excess of carbonic acid. Dr. Brown's investigations pointed to the opposite conclusion. He found that when air was charged with an excess of carbonic acid, a. g., with more than three parts per 10,000, plants growing therein were stunted between the nodes, while their flowering was almost entirely suppressed. Evidence of this kind must cause geologists to fall back on the numerous other theories which have from time to time been put forward to explain the physical conditions which gave rise to the formation of coal—one of which is that in those days the earth was nearer the sun, and therefore enjoyed a greater share of heat. My own view, however, is that, given a period of slow, uniform depression of the earth's crust over

a large level plain, a second deposit of coal would be formed under present climatic conditions. Such a plain would be situated in a rainy—but not necessarily the most rainy district on the earth's surface. It would be surrounded by lofty ranges of mountains, giving birth to rivers from time to time carrying detritus into the plain beneath. The peat bogs of Ireland are known to be many hundred feet in depth. They are neither more nor less than an incipient deposit of coal formed of modern plants under modern conditions. If the Bog of Allen were subjected to a slow and constant depression there is no reason to doubt that the underlying moss would in the course of ages become consolidated into coal.

Latest Mining Decisions.

Specially Prepared for THE MINING AND METALLURGICAL JOURNAL.

If the operator of a coal mine employs an examiner holding a certificate from the state board of examiners authorizing him to act as such, and the examination of the mine is made at the time required by law, it will constitute a compliance, so far as the operator is concerned, with the provisions of sections 4, c. 93, 2 Starr & C. Ann St. 2719, requiring inspection of mines to determine their safe condition. *Kellyville Coal Co. vs. Hill*, 87 Ill. App. (Ill.) 424.

An acceptance of reservation contained in a lease of "mines and minerals" under lands demised includes, prima facie, all those substances otherwise falling under the definition of minerals which have a use and value of their own, either for the purpose of sale, or for other purposes independently of, and separately from, the use of the rest of the soil, whether capable or not of being worked for commercial profit. *Johnstone vs. Crompton*, 68 Law J. Ch. 559 (1899), 2 Ch. 190, 81 Law T. (N. S.) 165, 47 Wkly Rep. (Eng.) 604.

Hurd's St. c. 93, § 44, provides that every laborer or miner who shall perform labor in opening and developing any coal mine, including sinking shafts, constructing slopes and drifts, mining coal, and the like, shall have a lien on all the property of the mine to the value of such labor. Held, where a bill was filed to have a lien declared against the property of a mining company, and it was nowhere averred in the bill that the work and labor performed were in "opening and developing" a coal mine, no lien could be had. *Borders vs. Uhe*, 88 Ill. App. (Ill.) 634.

The title to the underlying coal having passed to the lessee, the possession was thereafter referable to such title, which could only be distinguished by actual adverse possession distinct from possession of the surface. The failure of the lessee to enter and mine the coal for any length of time short of the 100 years would not affect his title, nor would it be forfeited to the lessor by a failure to pay the annual rental for a number of years, in the absence of any provisions for such forfeiture in the lease. *Plummer et al. vs. Hillside Coal & Iron Co. et al.*, 104 Fed. Rep. (U. S.) 208.

Laws Or. 1899, p. 62, providing that all mining claims shall be real estate, and the owner of the possessory right shall have a legal estate therein, applies to a mining claim which, at the time of the passage of the act, was property of the estate of a decedent; and such claim, not being held or required for any purpose of administration, passed at once by inheritance to the heirs as real estate, and they became entitled to maintain a suit, in any court of competent jurisdiction, to set aside an alleged collusive and fraudulent conveyance of the claim by the administrator. *Lohmann et al. vs. Helmer et al.*, 104 Fed. Rep. (U. S.) 178.

A power subsequently contained in the lease, for the lessor and those claiming under him, "to drain, get, and dispose of the said mines and minerals at his and their free will and pleasure, nevertheless not breking open nor doing any damage to the surface of the land, * * * or the buildings thereon, and making reasonable compensation * * * for all damage occasioned thereby," does not restrict the meaning of the words "mines and minerals" to such substances as can be worked for commercial profit. *Johnstone vs. Crompton*, 68 Law J. Ch. 559 (1899), 2 Ch. 190, 81 Law T. (N. S.) 165, 47 Wkly Rep. (Eng.) 604.

The law that, when a mine is once open, the sinking a new pit on the same vein is not necessarily the opening of a new mine, is inapplicable to a case where two portions of a settled estate are separated from each other by a strip of land

belonging to a different owner, although one continuous seam of coal runs under the whole. If, therefore, the seam of coal has been worked under one portion of the settled estate in the lifetime of the settlor, but not under the other, the unworked portion cannot be held an "open mine," even when the tenant for life has acquired the coal under the intervening strip. The court, in sanctioning a lease of the unworked portion, will consequently direct that three-fourths of the rent must be set aside and invested, according to subsection 4 of the settled-estates act of 1877. *In re Maynard's Settled Estate*, 68 Law J. Ch. 600 (1899), 2 Ch. 317, 81 Law T. (N. S.) 163, 48 Wkly Rep. (Eng.) 60, 63 J. r 552.

Cly. Code, § 305, declares that the business of a corporation must be carried on by its board of directors. Act April 23, 1880 (St. 188 p. 131), § 1, declares that it shall not be lawful for the directors of any mining corporation to sell leased property, or otherwise dispose of the whole or any part of the mining ground owned or held by such corporation, unless such act be ratified by the holders of at least two-thirds of the capital stock. Held, that where a mortgage on all the property of a mining company was invalid because of having been authorized at a directors' meeting at which no legal quorum was present, and thereafter two-thirds of the stockholders united in signing an instrument which purported to ratify the giving of the mortgage, the stockholders not having had authority to mortgage the mine under section 305, their ratification of the invalid act of the directors did not render the mortgage valid. *Cortin vs. Salmon River Hydraulic Gold-Mining & Ditch Co.*, 62 Pac. Rep. (Cal.) 552.

In the year 1865, Lady W., the plaintiff's predecessor in title, sold and conveyed to J. C. & Sons, Ltd., at the price of £28,500, all the mines, veins, and seams of coal, iron, and other ores under certain hereditaments known as the "S. Estate," containing 1,178 acres, or thereabouts, together with the full power to make, sink, and work all such pits, shafts, drifts, levels, * * * and do all such other acts as might be deemed necessary or convenient for working, searching for, getting and raising the same, and to do all other works and things which might be necessary or convenient for the purpose aforesaid, or any of them, doing as little damage as might be consistent with due and proper carrying out of the said works. The deed contained a covenant by the company not to sink any shaft, or drive any level, which should or might weaken or damage any building on the vendor's lands, and to make satisfaction to be assessed as therein mentioned for the spoil, or damage, or injury done to, in, and upon the said lands by the machinery for getting and raising said coal, or by sinking of working of any pit or shaft, or otherwise by virtue of or under the powers aforesaid. The defendants in this action were lessees of J. C. & Sons, Ltd. They were working, on the long-wall system, some of the deeper seams of coal under the S. estate, and had caused some subsidence of the surface in some places, but no substantial damage was proved. The plaintiff brought this action for an injunction to restrain the defendants from working the coal so as to cause subsidence of the surface. The defendants claimed a right to cause subsidence so long as they worked in a proper method. There was a conflict of evidence whether it was possible to work the coal at all without causing subsidence, but it was in effect admitted that it was not possible to do so at a profit. Held, that the grant of the minerals did not expressly or by necessary implication give power to let down the surface, and the plaintiff was entitled to the injunction. *Westmoreland vs. New Sharlston Colliery Co.*, 80 Law T. (N. S.) 846, affirming (1899) 63 J. P. 198.

TRADE NEWS.

Theo. Alteneder & Sons, 945 Ridge Ave., Philadelphia, Pa., have just issued a new catalogue describing their draughting instruments.

The Burt Mfg. Co. of Akron, O., has secured orders from the American Sheet Steel Co. for eleven of its well-known Cross oil filters.

The contract for furnishing the steel framework for the United States Navy Yard buildings at Port Royal, N. C., has been secured by Wm. B. Scaife & Sons of Pittsburg, Pa.

Fourteen carloads of water-wheel machinery have been shipped by the Stilwell-Bierce & Smith-Vallie Co. of Dayton, O., to the Sao Paulo Light & Power Co., in Brazil.

The Colorado Iron Works Co. of Denver, Colo., has received an order from the El Paso branch of the Mine & Smelter Supply Co. for a ten-stamp mill to be erected in Mexico.

The Welgele Pipe Works of Denver, Colo., report that they have turned out in the present year thirteen and one-half miles of pipe for placer mining and water power work.

A contract for furnishing two 300-HP. Stirling boilers to the Yellow Aster Mining Co. of Randsburg, Cal., has been placed with the Globe Engineering Works of San Francisco.

The directors of the Ludlow-Saylor Wire Co. of St. Louis, will meet in January for the purpose of increasing the company's capital stock from \$100,000 to \$400,000. A large addition to the factory has just been completed.

The American Impulse Wheel Co. has filed in the New York City courts a petition for the dissolution of the company, and Edward M. Burghard of 120 Broadway, New York City, has been appointed as receiver for the company.

The American Bridge Co. has secured an order for seven buildings from the Sterling White Lead Co. of New Kensington, Pa. It is also furnishing to the Rio Grande Western Railway thirty-six plate girder spans from its Chicago plant.

A plant consisting of fifteen large buildings of brick and iron, is being constructed by the Oil Well Supply Co., at Silver, a suburban town near Oil City, Pa. The site covers forty-two acres of ground, and the plant will have a railroad frontage of 3,000 feet.

The American Blower Co. of Detroit, Mich., has just sent out its new catalogue No. 116 describing its "A B C" high-speed vertical and horizontal engines. The company announces that printed matter concerning any of its lines will be furnished upon request.

The \$200,000 plant of the Gracelli Chemical Co., of Cleveland, O., has just been completed at Powderly, a few miles from Birmingham, Ala. The company manufactures sulphuric acid and other heavy chemicals, securing its raw materials from Cuba and Alabama.

It is reported that the Crucible Steel Co. of America will erect a \$1,000,000 plant next spring in the Pittsburg region. The designs will probably be such as to provide for twelve furnaces of a capacity of fifty tons daily. The plant will be operated as the St. Clair Steel Co.

J. Geo. Leyner of Denver, Colo., has sold a Leyner air compressor and full equipment of drills to the Gopher Mining Co. of Hill City, S. D. W. E. Haskell of Minneapolis is manager of the company. Mr. Leyner has also sold a sixteen-drill compressor and additional Leyner drills to the King of Arizona Co., at Mohawk Summit, Ariz.

The B. F. Sturtevant Co. of Boston, Mass., has within a few weeks received many foreign orders for its blowers, engines and other machinery. They are distributed as follows: 200 for Japan, seventy-five for Russia, forty for Germany, thirty-two for Canada, and twenty-four for Sweden, besides a number of smaller orders from Cuba, Mexico, and Central and South America.

The Northern Electric Mfg. Co. of Madison, Wis., has just secured for \$35,865 the contract for the complete electric lighting plant of the city of Detroit, Mich. The company manufactures motors, dynamos and other electrical machinery suitable for use in both mining and metallurgical establishments, and this handsome contract speaks volumes for the high grade of its machinery.

G. J. Orte of the Pueblo Brass & Iron Foundry has written the Joseph Dixon Crucible Co. that he is accustomed to get from fifty to sixty heats out of the Dixon crucible used in his foundry. In reply to a letter inquiring as to his method of using the crucible, he writes: "I received your letter of the 10th inst. In reply to it will explain how I got from fifty to sixty heats out of your crucibles. I first am very careful in annealing the crucibles and am very careful with good tongs not to squeeze them, and after pouring I take my skimmer and scrape all dross out of the inside of the crucible with good care, and handling with care I get these good results. I have tried other makes of crucibles, but could not get as good results as with Dixon's."

Smith & Thompson, manufacturers of fine assay balances at 2219 Stout St., Denver, Colo., have recently placed their balances with the following houses in addition to many others: American Smelting & Refining Co.—East Helena, Ellers, Grant, Omaha, Pueblo and Union Plants; Phila-

delphia Smelting & Refining Co., Pueblo, Colo.; Granby Con. Mining & Smelting Co., Grand Forks, B. C.; British Columbia Copper Co., Greenwood, B. C.; Sheffield Smelting & Refining Co., Sheffield, Eng.; Southern Smelting & Refining Co., Atlanta, Ga.; Boston Gold & Copper Smelting Co., Leadville, Colo.; The Juarez Co., Juarez, Mex.; Economic Gold Extraction Co., Gillette Gold Reduction Co., Colorado Ore Reduction Co., Eagle Ore Sampling Co., Elkton Mine Gold Coin Mining & Leasing Co., Stratton's Independence Mine, East Dollar Mining Co., Victor Gold Mining Co., Vindicator Con. Mining & Leasing Co., Anchorea Leadland Mine, and Mary McKenney Mining Co., all in the Cripple Creek district; Great Northern Mining & Development Co., Gilt Edge, Mont.; Homestake Mining Co., Lead, S. Dak.; Mascot Gold Mining & Milling Co., Moscow, Idaho; Northwestern Sampling & Milling Co., Wallace, Idaho; Spearfield Gold Mining & Reduction Co., Preston, S. Dak.; Wasp No. 2 Mining Co., Deadwood, S. Dak.; Bald Mountain Gold Mining Co., Sumpter, Ore.; Cold Spring Gold Mining & Tunnel Co., Sallina, Colo.; Cortland Gold & Silver Mining Co., Ohio City, Colo.; Provincial Assay Office, Belleville, Ont., Canada; State School of Mines, Golden, Colo.; Minnesota School of Mines, Minneapolis, Minn.; Ledoux & Co., New York City; Mexican Ore Co., Parral, Mex.; Old Ironsides Mining Co., Phenix, B. C.; Jersey Blue Milling & Gold Mining Co., Ohio City, Colo.; Southwest Chemical Co., Argentine, Kan.; Union Gold Extraction Co., Florence, Colo.

PERSONAL.

T. Hoysoy, chief of the Bureau of Mines of Japan, and Kampachi Kameo, a mining expert, also a representative of the Japanese Government, have been visiting the anthracite regions of Pennsylvania, inspecting the methods of mining employed in that section.

Joseph McDonald, a well-known Montana mining man, has been appointed manager of the Treadwell mine on Douglas Island, Alaska. He has resigned his position as manager of the Helena-Frisco mine, in the Coeur d'Alenes, and will shortly leave for Alaska.

F. C. Schrader has arrived at Seattle with the party which accompanied him as the representative of the United States Geological Survey on a trip to Copper River. Mr. Schrader's mission was to prepare a report on the copper deposits of that district, notably on the east side of the Copper River Basin, in what is known as the Chittana country.

Asa M. Mattice, for some years principal assistant to E. D. Levitt of Cambridgeport, Mass., has been appointed engineer of the Westinghouse Electric & Mfg. Co. Mr. Mattice was graduated from the Naval Academy in 1874, and was a classmate of B. H. Warren, vice-president of the Westinghouse Company. He had an important part in designing the machinery of the battleship Maine, as assistant to Admiral Melville.

Herbert E. Goodman, manager of the Goodman Mfg. Co., lost both legs recently in an accident at the Vintondale colliery, near Johnstown, Pa. Mr. Goodman was inspecting an electric drill installed by his company when a wagon used to haul coal broke away from its cable and started down the incline. Mr. Goodman's associates escaped, but he was not so fortunate. Although his injuries are severe, it is believed that he will recover.

The name of John W. Gates of American Steel & Wire fame is connected with the contemplated organization of the railroad to connect Los Angeles and Salt Lake City. It is said that Mr. Gates and others have secured options on vast tracts of coal and iron lands, through which the new road will pass. It is reported to be the purpose of Mr. Gates and his associates to build enormous steel plants in the vicinity to supply the Pacific Coast and the Oriental trade.

It is announced that Thomas F. Walsh, the successful owner of the Camp Bird mine in Colorado, will donate to charity the salary he received from the United States Government for acting as commissioner to the Paris Exposition. The amount of the salary is \$3,000. This will be divided into three equal parts, which will go to the Associated Charities of Washington, D. C., the Associated Charities of Denver, and the Sisters of Mercy Hospital at Ouray, near which town the Camp Bird mine is situated.

Edward S. Cobb, who for seven years was a member of the firm of Cobb & Hesselmeier, the San Francisco firm of designing and consulting mechanical and hydraulic engineers, has opened an office in the Homer Laughlin Bldg. in Los Angeles, Cal. Mr. Cobb has been identified with

some of the largest hydraulic plants in operation in northern California. He was educated in one of the best known polytechnical schools in the east and has had twenty years of practical experience. His standing as an expert on hydraulics and mechanics places him in an enviable position. Mr. Cobb says he intends to give special attention to all matters connected with the development, measurement and uses of water, whether for irrigation, domestic use, manufacturing or power purposes and will furnish estimates, plans and specifications for steam power plants, water power development, pumping machinery, for either water or oil, and machinery for mining operations.

Construction and Development News.

The Big Vein Coal Co. at Shaw, W. Va., will develop coal mines and construct a narrow gauge railway. A. C. Rawlings is superintendent.

A. R. Thomas of Chattanooga, Tenn., has purchased coal property on Lookout Mountain, and has organized a company for development work.

The Knoxville Zinc Mining & Smelting Co. is considering the erection of a large smelting plant at Knoxville, Tenn. It will sink a new shaft at its mine.

The Colt Coal & Coke Co., authorized capital \$100,000, has been organized at Colt, W. Va., by Michael Crouse, G. J. Crouse, Richard Seamore and others.

J. L. Boyd is manager for the Proctor Coal Co. of Knoxville, Tenn., which has recently purchased the mines of the Indian Mountain and Jellico Coal Co. at Jellico.

A mine of magnetite and magnetic iron ore has been discovered by Granville Beale at Calhoun Falls, S. C. Mr. Beale is likely to install an equipment of machinery.

Otto A. Kohlhasse has bought the properties of the Imperial Coal Co. at Knoxville, Tenn., and has organized a company capitalized at \$10,000 to operate the coal beds.

The Texas & Pacific Coal Co., of which Edgar L. Marston of St. Louis is president, is about to increase its capital stock to raise money for the development of its coal mines at Thurber, Texas.

CORRESPONDENCE

ARIZONA.

[From Our Special Correspondent.]

Tucson, Ariz., Dec. 3, 1900.

A smelter in or near Tucson will not only be a paying proposition or investment to the projectors, but will be the means of starting work on many claims that are now laying dormant.

The Majestic copper mines, a group of claims owned by Austin & McBride five miles from Tucson, is attracting notice because of the immensity of the ore deposits and their proximity to the city. They intend to develop their property, which contains eleven claims, three of which have heavy bodies of ore, averaging from three per cent to eighteen per cent copper, with some silver and gold. There is no doubt that these properties will develop into rich paying mines as the work progresses.

A party of miners has gone to Arizona to commence work on the War Eagle mine, seventy-seven miles southeast of Gila Bend, Maricopa county.

W. A. Hanson, who is working for Crockett & Wyman on the Reward mine, twenty-seven miles southwest of Casa Grande, reports work progressing very favorably.

MICHIGAN.

[From Our Special Correspondent.]

Houghton, Mich., Dec. 8, 1900.

Small shipments of heavy copper have been sent to the Quincy smelter at Hancock by the Adventure and Victoria mines. This is the first production the mines have made under the present managements. The copper was taken from open work exclusively.

No. 2 shaft of the Winona is showing strongly in copper at the fourth level. The formation is much disturbed at the Winona, the Wyandot and the Elm River mines. The conditions are becoming somewhat more regular at the Winona.

The amygdaloid lode in the Quincy and Franklin mines carries considerable silver, and is showing sufficient ore to justify further careful exploration.

The new steel mill of the Isle Royale, on which work was started a year ago in a preliminary

way, is nearing completion. The mill will contain three stamps, with room for three more, and necessary jigs and finishing machinery. The building is fireproof, being of steel on a substructure of stone. It is said that few of the old-style wooden mills will ever be built again in the copper district. Although the steel mills are more expensive at the start, their exemption from fire and the saving in insurance more than counterbalances the greater initial outlay.

Now that the Traverse Bay & Mohawk Railroad is completed, it is possible that new steel mills will be constructed on the Wolverine and Mohawk mines, on the Keweenaw Bay, on the shore of Lake Superior, early next spring. These will be large mills and will cost very nearly a quarter of a million each.

Work on the new mill of the Mass mine is at a standstill, owing to the delay of manufacturers in furnishing the structural steel when promised.

The management of the Centennial is planning the erection of a modern steel mill on Torch Lake, opposite the three mills of the Calumet & Hecla.

Development work is now progressing smoothly at the old Clark copper mine, near Copper Harbor, which is being reopened for manganese. Several cargoes will be mined during the winter for shipment early next season. Manganese is obtained as a by-product in a number of the cupriforous and argenticiferous ores of Colorado and Utah, and also to a limited extent in the mangiferous iron ores of Wisconsin and Michigan, but the Clark is the only real manganese mine now working in the United States. The ore is found in the form of an impure pyrolusite.

Work at the Halliwell property in the Porcupine Mountain district has been stopped for the winter. The operations there during the past season were confined almost entirely to the use of the diamond drill. The formation seems considerably disturbed in the neighborhood of the Halliwell, and there has been much difficulty in keeping track of the Noble and Mass lodes. The Porcupine Mountain district contains the secondary or sedimentary division of the Keweenawan formation and the copper is carried in sandstone and sandstone conglomerates usually in the form of extremely fine particles, which it has been found difficult to save by any process of milling so far tried.

A second cargo of sixty tons of mohawkite has been shipped to smelters at Swansea, Wales, by the Mohawk mine. There being nearly thirty per cent of arsenic, by weight, in this ore, none of the American smelters can handle it. Such a vast quantity of arsenic poured forth into the air would be a serious menace to human life as well as to vegetation. At Swansea there are smelters built especially to reduce the arsenical copper ores from Cornwall, and in these the fumes of arsenic are drawn into brick sublimation chambers, where the arsenic is deposited on the walls and roof on cooling, after which the crystals are scraped off from the brick by workmen wearing respiratory masks and are barreled for shipment like so much sugar. If the mohawkite deposit proves as extensive as is now promised, arsenical smelters will doubtless be built in this country to handle the ore.

GENERAL NEWS

ALASKA.

Reports keep coming down to Washington of fabulous discoveries of gold in Alaska. Most of the reports contain an unnecessary supply of superlatives, and about every other story reports the "richest quartz ledge ever known," or something of the kind. It is not difficult, however, for experienced mining men to distinguish between the well-founded reports and those which seem to be groundless.

In the Gleaner group on Taku Arm in the Atlin district a ledge of unusual richness has been uncovered. Samples of the ore have been shown by David Von Cramer, who says that the ledge is eighteen feet wide, and contains a streak of wonderfully rich ore.

A. G. Preston of White Horse brings news that the force at work on the copper mines has been doubled since the completion of the railroad to White Horse. The ore of the district is very rich and there seems to be no end to it.

The belt, so far discovered, is about fourteen miles long by two miles wide, and equally rich ore is found in all parts of the belt. The assays run as high as seventy-two per cent copper, \$20 in gold, and fourteen to fifteen ounces in silver. Several mines, including the Copper King and

War Eagle, will ship ore this winter, sending it by sleds to the railroad.

The official report of the Treadwell mine at Juneau for the year ended May 31 shows that during the year bullion was sold to the amount of \$1,153,368. The year's working profit was \$673,991, and four dividends were paid amounting to \$300,000, or six per cent upon the capital stock. The average expense was a trifle more than thirty-six cents a ton, leaving a net working profit of \$1.20 a ton. The ore now in sight is estimated at over 4,000,000 tons.

A letter from Cook Inlet states that the richest placers known in that district were found last month. Jack Sutton took from his Canyon Creek claim gravel giving \$10 a pan. Two men working a lay on Lynx Creek cut through a bar averaging \$20 a day per man. In two weeks they took out about \$1,500 worth of gold.

The strikes have caused great excitement. Two weeks ago mining operations in the district were suspended for the winter. A rich strike has been made on the Monte Carlo, Index District, Washington. At a depth of 320 feet the tunnel encountered a vein of gray copper, yielding values of nearly \$100 per ton in gold and silver.

ARIZONA.

The Commonwealth Mining Co. at Pearce, has its new stamp mill nearly ready for operation. A new double compartment shaft is being sunk, and will be extended down below water level. Water was encountered in the mine in the old shaft at 427 feet, and although it was known that rich ore could be found below that depth, sinking was stopped because of the small size of the shaft. Pumping machinery will be installed to handle the water met in sinking the shaft deeper.

The Copper Bullion Mining Co. has a property in South Pass which seems to be promising. In tunnel No. 1 rich ore beds have been opened up, the sulphides running from ten per cent to sixty per cent in copper, carrying from fifty to 125 ounces of silver, and from \$3 to \$20 in gold. A steam hoist and pump will soon be installed.

Report comes from Tucson that the Great Western Copper Co. has recently opened up one of the finest ore beds ever shown in that vicinity. The ore is a carbonate, carrying considerable glance and is about fifteen feet wide, with a high average in copper, besides some gold and silver.

CALIFORNIA.

An unconfirmed report from the Eagle Mountains in Riverside county states that a ledge of gold ore eighty feet thick, running from \$15 to \$17 per ton has been found in the Iron Chief mine.

Nineteen four-horse teams are kept busy filling cars at Perris, Riverside county, with an earl^a used at the Colton cement works. This particular kind of earth used in the manufacture of cement is found about one mile from Perris along the line of the Southern California Railroad.

Samples taken from the centre of the west cross-cut in the Lincoln mine in Amador county show much free gold and sulphurets. A cleanup of the mill recently netted \$4,673.

The Taylor Mountain coal mines in Sonoma county are to be worked soon. Colonel A. C. Hammon of San Francisco is looking after the work, which will comprise a tunnel, which will cut some of the principal veins in a blocking process.

The future of the Rand mining district never looked brighter than at present. The mines generally are producing well, and the business outlook is good. The Yellow Aster Mining Co. has let its contract for the 100-stamp mill, and it is specified that the mill must be pounding ore by March 1. The mill will cost complete about \$80,000. Sufficient water is already developed to run it, \$75,000 having been put into water development in the past six months. The new mill will add to the bullion production of the Rand district \$100,000 per month, reckoning at the same rate as their thirty-stamp mill turns out.

The new mill at the Clio mine, near Jacksonville, Tuolumne county, is running on good ore from the new shoot, and instead of twelve hours a day it will soon be running twenty-four hours.

The tunnel at the Ocoela mine in Sierra county is in 360 feet and the ore is getting very rich as progress is being made. The indications now are that this will be true of the largest producers in the state. It is on the same lead as the plumbago which cleaned up \$44,000 in September with a ten-stamp mill.

At the Longfellow mine at Big Oak Flat, Tuolumne county, the Chlorination plant has been running successfully. Reports of the addition of ten stamps to the mill are made.

The work of erecting the Huntington mill for the Parker Mining Co., sixty-five miles down the Colorado river from Needles, on the California side, in Riverside county, is progressing. A force of men is working in the mines located four miles from the mill, and are getting out plenty of good ore. A force of men is also working on the road from the mine to the mill, over which the ore will be hauled. Prospects are good for a very lively camp there this winter.

Stanley & Hirschfeld have had five tons of ore from their mine—the Jennie B.—located in the slate range, milled at the Red Dog mill near Randsburg. It turned out a little better than \$50 per ton. It was light gold and hard to save, but the rock is very rich, and the mine is developing better. It is free milling ore.

W. J. Cole, who is interested in the Carpet Tack mine, above the Riverside mine at Columbia, Tuolumne county, is about to open the H. E. gravel mine at the head of French Gulch.

N. S. Lewis and Fred. Shaffer of Kilmefelter, San Bernardino county, report the opening of some fine copper properties in their section. There have been some remarkably high assays from this portion of the country, and although nothing of very great permanency has been found in the past, it is an indication of the riches that are there to be developed, and it is hoped these people have located it.

The Confidence mine near Sonora, Tuolumne county, has started its mill again. A large force of men have been employed.

An examination of the Mariposa mine near Mariposa, was recently made by L. D. Ludwig.

It is expected the granite quarry on the old Southsby ranch in Tuolumne county will soon be in operation, as outside capital has taken hold of the proposition.

At a depth of sixty-four feet some high-grade ore is being taken out of the Fairview mine near Cisco, Placer county.

The new mill on the Brown Bear mine at Deadwood, Trinity county, has been started. It is a complete ten-stamp mill, and will be run on ore from the old workings. The lower tunnel is being run as rapidly as possible and expects to strike the ledge shortly.

Black Nugget, Dry Placer Camp, twenty miles from Barstow, continues to produce considerable gold. Pay-dirt is from six inches to three feet in depth.

COLORADO.

Gold properties in the East Mancos district, Montezuma county, have been purchased by James Doyle of the Portland mine, Cripple Creek district. No great showing has yet been made in that district.

The Superior mine at Ward, Boulder county, is attracting considerable attention. A company backed by Indiana men was organized last spring, and a forty-acre tract was secured, upon which a shaft has been driven. Machinery has been installed, and development work is progressing rapidly. Ore shipments will not be made until next spring.

The Leadville district records a daily output of ores amounting to 2,500 tons. Besides the iron, lead, silver and gold products a considerable tonnage of zinc, bismuth, and manganese is recorded. The bismuth is sent direct to London.

A Boston company is working on an old mine twelve miles from the town of La Veta, on the east slope of the West Spanish Peak. This mine was prospected to some extent seven years ago. A vein of gray copper in the Bull's Eye shows assays of \$700 a ton. When the property was formerly worked, about thirty cars of ore were shipped to Pueblo, netting about \$90 a ton. Five companies are now working in the Spanish Peak district, and a mill is expected to be set up next spring.

Good reports are received from the New York and Brooklyn in the Red Mountain district where a strike was recently made. One assay shows 110 ounces of gold to the ton. Local miners control the property.

A fourteen-inch streak of ore carrying iron, yellow copper and some galena, has been located on the Alaska claim in the Georgetown district.

IDAHO.

A chlorination plant will soon be erected at the Iowa mill, Quartzburg, by the War Eagle Co.

Developments on the property of the North Star mine, on Shaw's Mountain are promising. Large bodies of ore and rich gold being found.

The tunnel on the War Eagle property is now

down over 2,700 feet, and still deepening at the rate of ten feet a day. It is expected that the tunnel will cut the first ledge about May 1.

MEXICO.

On January 1, the reduction and concentrating plant of the Union Mining Co., operating several rich mines in the Panica district, will be completed. The new stamp mill of Hrewater & Adams will be ready about the same time.

Several valuable mining properties in Mexico, purchased by the late Marcus Daly, will pass into the hands of some of his associates, and will be developed on an extensive scale.

A number of promising mining properties near Moctezuma, Chihuahua, have been obtained by the Pass City Mining Co.

A railroad, connecting the Aztec, Carbonate and other rich mines located on Mitre Mountain, near Monterey, with the smelters of that city, is soon to be built. An immense tonnage of ore is assured.

Large bodies of carbonate and galena lead ore have recently been uncovered in the Veladero mine, in the Mitre Mountain district, State of Nueva Leon.

Considerable activity is reported in the San Pedro mining district. The El Carmen, the Olevia, and the San Salvador, all owned by Americans, are producing large quantities of paying ore.

The rich Mulatos gold mine, located in the State of Sonora, about 200 miles from Quayma, is producing quantities of ore. This mine was acquired several months ago by New York and Pennsylvania capitalists. A party of New York men, who are interested in the property, are now on a visit to it. The property is the largest in Mexico, being a grant from the Federal Government, covering six square miles. A 100-ton concentrating plant is in operation. The capacity of this plant is to be increased to 300 tons.

A vein of rich silver ore, assaying as high as 294 ounces a ton, has been struck in the Bonito mine, in the Parral district, Chihuahua.

MICHIGAN.

Captain W. A. Dunn of Houghton is said to have secured an option on the Belt mines which had a disastrous experience in 1884, when owned by an English corporation. The experts who represented the Englishmen at that time reported the property as better than the Calumet & Hecla, and on the strength of the reports signed by the experts, the English corporation put \$1,300,000 into the venture. After the expenditure of vast sums for improvements and machinery, it was found, when the mill started, that the mines could furnish only 200 tons of stamp rock a day, and the Englishmen gave up their job in disgust. Captain Dunn now represents a strong Philadelphia syndicate which will make another effort to operate the mines.

On the morning of the 7th a fire was discovered in the coal shed of the Calumet & Hecla at the Lake Linden smelters. It is said that the fire was caused by spontaneous combustion. There were 1,000 tons of coal stored in the shed. No serious results can follow this fire, further than the direct loss entailed, which will be small.

The Calumet & Hecla Copper Mining Co., Saturday, filed articles of association in renewal with the county clerk at Houghton. The corporate existence of the old company will expire April 21, 1901. In a few months less than thirty years, the company has paid dividends of \$70,000,000, and by the end of next April will have added \$1,000,000 more, in all likelihood the largest sum ever paid in dividends by any mine in the world. The sum of \$73,000,000 odd by the Consolidated California and Virginia from the Comstock lode, silver, is the largest record at present.

It is expected that the No. 5 shaft, the great shaft of the Tamarack, will reach the Calumet lode by Christmas. At present neither the shaft, nor any of the crosscuts started therefrom, have reached the Calumet vein, but every indication in Tamarack and in the Calumet points to the bottoming of the No. 5 shaft in as rich ground as has ever been opened either in the Calumet & Hecla or the Tamarack. In fact, the lode in its richest part at this point should contain about five per cent of copper; although working the lode the full width and stamping poorer rock from lean sections of the mine, should give a net result of not more than three per cent copper in the rock. The Nos. 3 and 4 shafts of Tamarack are still in ground as "rich as mud."

MONTANA.

The fire which has been burning for several weeks in the Bell mine of the Anaconda Company proved so dangerous on the 7th that a dozen men narrowly escaped death by asphyxiation. It was then said that the fire has eaten its way into the sulphide ores, and was getting beyond the control of the men.

OREGON.

John L. Rand of Baker City has a bond on a section of the Greenhorn district in which a body of rich silver ore has recently been encountered. The Sumpter Forwarding Co. has taken a contract for shipping the ore during the winter, and teams have been engaged to haul it to the railroad. The surface ore runs \$67 in silver, \$13 in gold, and there is said to be enough ore in sight to keep the mine running for two years.

James M. Panting, manager of the Gold Hill mine north of Baker City, says that development work is progressing well on that property, and that values are increasing with depth.

SOUTH DAKOTA.

Report comes from Custer that the Omaha Mining Co. has decided to sink its shaft at the North Star mine 100 feet deeper, which will make the shaft 400 feet in depth. At the 300-foot level, the ore body is eight feet wide, averaging about \$18 a ton.

Ten miles north of Custer, on Spring Creek, a promising strike of copper ore has been made. A ledge of ore 100 feet wide has been cut, which will assay about ten per cent in copper. The ledge seems to be a fissure vein. The Copper Butte Mining Co. owns the ground. If when the shaft is sunk on the vein the ore continues in depth, large reduction works will be erected.

The mica industry is thriving at Custer. Mines are being operated by the Chicago Mica Co. of Chicago and the Sils-Eddy Mica Co. of New York City. The last named company has contracted for the entire output of the New York mica mine owned by C. A. Dow of Sioux City, Iowa, and located eight miles west of Custer. The mica of the Black Hills is not usually clear, and is, therefore, of little use for stove windows and similar purposes, but has the advantage of being free from iron, which makes it especially valuable for electrical work, and as it is estimated that ninety-five per cent of the mica mined in the world is used in the electrical industries, it will be seen that the cloudiness of the South Dakota product is not a very serious disadvantage. The New York mine produces many blocks of mica which are of unusual size. A New York expert who has visited the mica districts, expresses the opinion that the Black Hills have enough mica to supply one-half the world's demand.

It is rumored in Deadwood, that plans are under way for the purchase of the St. Elmo stamp mill, five miles southeast of Hill City. Eastern financiers who are also figuring on buying the Clara Belle mine, are the most likely purchasers. The three brothers who own the Clara Belle have opened up a ledge of ore at the 100-foot level, which will compare well with the Holy Terror mine. The pay shoot is about fifteen feet thick, and fifty feet long.

Northwest of Deadwood a valuable deposit of asbestos has been uncovered, which is shown to be of unusually fine fibre. The deposit is about three feet thick, and fibres from ten to twelve inches long have been taken out. The asbestos has withstood several fire tests and other methods of examination to determine its merchantable qualities.

UTAH.

It is reported that Milan Packard, manager of the Star Consolidated, now controls 36,000 shares of that company's stock, leaving 140,000 in the hands of all other owners. Mr. Packard recently secured 60,000 shares, paying \$60,000 for them. The mine is said to be a most valuable one, and it is believed that more ore is exposed now than at any previous time in the mine's history.

The Anchor Mining Co. of Park City has issued its annual report showing a production of 5,200,000 pounds of lead, 155,581 ounces of silver, 330 ounces of gold and 3,800 ounces of copper in the past ten months.

WEST VIRGINIA.

Thirty-nine big coal operators in the Fairmont field have formed a combination and will run under the name of the Fairmont Coal and Mining Co. The new company will handle the entire out-

put of the Fairmont region and will be able to fill large orders on short notice. One of the objects is to fill foreign orders by dividing the order and loading a ship in a single day where it would take weeks if given to a single mine.

On Nov. 22 negotiations closed whereby 25,000 or 30,000 acres of coal lands in the counties of Braxton, Gilmer and Lewis passed into the hands of New York and Pennsylvania capitalists, and with the tract the Little Canawha railroad projected from Parkersburg to Burnsville, of which thirty-one miles are built. It is thought that this transaction insures the completion of the railroad into the coal fields. The Braxton Coal Co. has been formed, and will open the coal and commence work on both ends of the railroad at once. The subscribed capital of the Braxton Coal Co. is \$3,000,000.

The Big Vein Coal Co. will open up a new mine at Shaw, seven miles from Piedmont, and will build one mile of railroad to the West Virginia Central. This is the same coal as found in the Elk Garden field.

The Dickey-Gibson Coal Co. has opened up mines at Franklin and made its first shipment of coal. It will increase its force as rapidly as it can provide room for additional miners.

Goeke & Co. are opening up new mines at Howesville, Preston county, and are putting in some fine new machinery. The Arona mines, three miles from Howesville, are now running a force of about 100 men.

J. V. Thompson, of Uniontown, Pa., had 7,000 acres of coal land leased in Ohio county this summer and has paid the money for it, aggregating \$160,000. The coal will be developed at once.

The Junior Coal Co., which is a part of the Davis Coal & Coke Co., recently purchased 1,300 acres of coal land near the Randolph-Barbour county lines, adjoining another large tract of land owned by them. The price was \$50,000.

An immense tract of coal land in Randolph county is owned by farmers who have entered into an agreement not to sell their coal lands for less than \$100 an acre. This is about ten times as much as the coal companies usually pay for land, but after the companies get the land they can rarely be induced to sell it for \$200 an acre.

BRITISH COLUMBIA.

It is now said that the Van Anda mine on Texada Island ranks among the best properties in the Province. The smelter has been enlarged to 125 tons a day and is running successfully with a net output of \$5,000 a month. Five years ago the present owners bought the mine for \$50,000, and at its present rate of production the mine is paying six per cent on \$1,000,000. The general average of the ore now being taken out is \$27 a ton in copper, gold and silver.

The Rossland mines are now showing a total output averaging 6,000 tons weekly.

The report recently made asserting that \$10,000,000 of ore was in sight in the Britannia copper mine on Howe Sound, has been confirmed by London experts representing the Valentine Syndicate. This syndicate is now willing to purchase the property for \$2,000,000 or more, but the owners are not as likely to sell as they were at one time.

IRON AND STEEL

BIG STEEL WAR THREATENED: The latest move of the Carnegies, according to reports from Pennsylvania, will be the starting of an independent movement against the American Sheet Steel Co. It is alleged to be the plan of the Carnegies to induce one of the strongest branches of the American Sheet Steel Co. to withdraw from that combination and to start an opposing company with the backing of the Carnegie Co. Richard G. Wood of McKeessport, Pa., who was said to be back of the movement, flatly denies the report. He says that his concern could not in any case withdraw from the American Sheet Steel Co., and he says there is no truth in the statement that he will have the backing of the Carnegie capital in organizing a new steel plant.

DOMINION IRON AND STEEL: The Dominion Iron & Steel Co. now claims to be able to produce pig iron at tidewater cheaper than it can be produced at tidewater in any other part of the world. The company is organized to develop the iron and steel business in Cape Breton and Nova Scotia, using coal from the Dominion Coal Co. and ore from extensive mines in Newfoundland. The plant includes four blast furnaces, each of a capacity of from 250 to 400 tons daily; ten basic open hearth steel furnaces, of a capacity of

about 1,000 tons of steel daily. The company does not propose to extend the manufacture of steel beyond the billet stage, but may later add a plate and rail mill. The plant when complete will cost \$10,000,000. The Dominion Government will pay a bounty running to 1907, and averaging for the whole period \$1.50 a ton on iron, and \$2.25 a ton on steel.

NO TROUBLE IN PITTSBURGH: Pittsburgh despatches report that trouble has broken out in the steel plate pool and there is a possibility that it may be disrupted. The trouble is in regard to freight rates, Eastern mills being opposed to those of Pittsburgh and the West. It is likely a meeting will be called for next week in New York to consider the matter. Regarding the report from Pittsburgh, New York representatives of the largest steel companies interested say that they have no knowledge of the matter, nor of the report that a meeting will be held in this city next week to consider the question. A representative of the traffic department of the National Steel Co. says, however, that it was rumored recently that the rates on billets from the Pittsburgh district to New York were likely to be slightly reduced. It is believed that the latest rumor from Pittsburgh came from this source.

THE REPORTED CRAMP CONSOLIDATION: Chas. H. Cramp has been interviewed with reference to the reported efforts of Vickers Sons & Maxim of England to form a business union with the Cramp Shipbuilding Co. and the Midvale Steel Works. Mr. Cramp says that for many years he has tried to extend the facilities of his plant so that it could turn out a first-class warship complete, including hull, machinery, equipment, guns, armor and ammunition. With this purpose in view he has often consulted other companies, including the Carnegies, the Bethlehem Steel Co. and the Midvale Steel Works. This enlargement of the industry and union of forces is made practically necessary, Mr. Cramp says, by the consolidation of many companies abroad, which enables the foreign companies to take orders for battleships which could be sent from the shipyards direct to battle, except for their quotas of officers and men.

SUIT AGAINST ENSLEY FURNACES: The American Steel & Wire Co. has filed a bill in the United States Court, at Birmingham, Ala., against the Alabama Steel & Wire Co. of Ensley, Ala., seeking to enjoin the latter from the further use of the McGilvried and Nash patent for the treatment of metals which, it is charged, the defendants have infringed upon at the Ensley plant. The complainants further ask that the apparatus using the process be destroyed and they make a final claim for \$100,000 damages. By many it is suspected that the suit is part of a process to be carried on for the ultimate acquisition of the Ensley plant, which has cut considerable figure in the complainant's former trade territory in the Southwest. The Ensley plant is now operating on double turn and selling its entire output. It was recently reported that the Carnegie interests made an offer for the purchase of the plant, and that the Schuylers, the principal owners, were considering the offer, but the Schuylers have since positively stated that the plant is not on the market.

IRON AND STEEL IN TURKEY: Consul Hughes, of Coburg, under date of October 23, 1900, sends the following translation from the Neue Wiener Tageblatt: "Though in nearly all the Turkish provinces iron ore is to be found, there are no blast furnaces nor manufacturing shops, and the finished iron business is of the most limited description. Import into Turkey, both in iron and steel, is consequently of considerable importance, amounting to 60,000 tons annually, valued at 18,500,000 francs (\$2,570,500). Imports at Constantinople alone are, on an average, 20,000 tons, worth 7,500,000 francs (\$1,447,500) per annum. Chief supplies were sent from Sweden and Belgium, while England, which takes the first place in all other trade with Turkey, sends only about 6,000 tons per annum. Turkey imports from Austria-Hungary about the same amount as from England, but in the German business an improvement has been noticed of late. Formerly the iron works of northern France did a strong business with Turkey, but they have long been compelled to give way to the more successful Swedish and Belgian firms. Quite recently, however, efforts have been made to recover the lost ground. What Russia sends to Turkey has not been of any weight hitherto, but her works have been trying hard to extend their trade with the Ottoman Empire from year to year. Besides railway and engineering requirements, iron bars and girders are the principal articles taken. The con-

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Ingersoll-Sergeant Drill Co., N. Y. City.
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AMALGAM PLATES

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Asphalt Paper Pipe Co., Los Angeles, Cal.
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Low E. Aubrey, Los Angeles, Cal.
Baker & Co., N. Y. City and Denver, Colo.
E. E. Hurlingham & Co., Denver, Colo.
Baily & Monble, Denver, Colo.
Wm. M. Courtis, Detroit, Mich.
L. B. Darling, Providence, R. I.
Louis Falkenberg, S. Francisco, Cal.
Hamilton & Morrison, Philadelphia, Pa.
A. A. Hanks, S. Francisco, Cal.
C. C. Hanks, Leadville, Colo.
Ogden Assay Co., Denver, Colo.
H. A. Perez, Los Angeles, Cal.
John T. Reed, San Bernardino, Cal.
D. W. Rockhart, El Paso, Tex.
Hickok & Banks, N. Y. City.
Solby Smelting & Lead Co., S. Francisco, Cal.
Ernest H. Simonds, S. Francisco, Cal.
Simonds & Walworth, N. Y. City.
State Ore Sampling Works, Denver, Colo.
Wade & Wade, Los Angeles, Cal.
Henry E. Wood, Denver, Colo.

ASSAYERS' SUPPLIES

Wm. Almsworth & Sons, Denver, Colo.
Baker & Adamson Chemical Co., Easton, Pa.
Baker & Co., N. Y. City and Newark, N. J.
Denver Fire Clay Co., Denver, Colo.
New Std Concentrator Co., Los Angeles, Cal.

DRILLS (ROCK)

Edw P. Allis Co., Milwaukee, Wis.
American Diamond Rock Drill Co., N. Y. City.
M. C. Bullock Mfg Co., Chicago, Ill.
W. H. Emannuel, Denver, Colo.
Richards & Co., Ltd., Philadelphia, Pa.
Roeseler & Hasselbacher Chemical Co., N. Y. City.
Smith & Thompson, Denver, Colo.
John Taylor & Co., S. Francisco, Cal.
Henry Troemner, Philadelphia, Pa.
Western Chemical Co., Denver, Colo.

SABBITT METAL

Joshua Hendy Machine Wks., S. Francisco, Cal.

BANKERS AND BROKERS

Lytle & Co., Galena, Kan.

BELT DRESSING

Jos. Dixon Crucible Co., Jersey City, N. J.

BLENDING

Edw P. Allis Co., Milwaukee, Wis.
Gutta Percha & Rubber Mfg Co., S. Francisco, Cal.
Goodyear Rubber Co., S. Francisco, Cal.
Joshua Hendy Machine Wks., S. Francisco, Cal.
J. H. May Mfg Co., Chicago, Ill.
Robins Conveying Belt Co., St. Louis, Mo.
Shultz Belting Co., S. S. Machinery Co., Denver, Colo.

BLACK DIAMONDS

Bernard Bandler, N. Y. City.

BLASTING BATTERIES, ETC.

Metallic Cap Mfg Co., N. Y. City.

BOILERS

Edw P. Allis Co., Milwaukee, Wis.
California Anti-Corrosion Co., S. Francisco, Cal.
Colorado Iron Works, Denver, Colo.
Fairbanks, Morse & Co., Chicago, Ill.
Joshua Hendy Machine Wks., S. Francisco, Cal.
Lidgerwood Mfg Co., Springfield, O.
Chas. C. Moore & Co., S. Francisco, Cal.
Murray Iron Works, Burlington, Iowa.
Ruggles-Coles Engineering Co., N. Y. City.
S. S. Machinery Co., Denver, Colo.
Wm. B. Scalf & Sons, Pittsburg, Pa.

BOILER COMPOUNDS

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California Anti-Corrosion Co., S. Francisco, Cal.

BOILER TUBE CLEANERS

Coggeshall Mfg Co., N. Y. City.

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Mining & Metallurgical Journal, N. Y. City.
D. Van Nostrand Co., N. Y. City.

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Joshua Hendy Machine Wks., S. Francisco, Cal.

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A. Leschen & Sons Rope Co., St. Louis, Mo.

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Jeffrey Mfg Co., Columbus, O.
Thompson & Boyle, Los Angeles, Cal.
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A. Leschen & Sons Rope Co., St. Louis, Mo.

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Roeseler & Hasselbacher Chemical Co., N. Y. City.
John Taylor & Co., S. Francisco, Cal.
Western Chemical Co., Denver, Colo.

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Williams Patent Crusher & Pulverizer Co., St. Louis, Mo.

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Colorado Iron Wks., Denver, Colo.
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Robins Conveying Belt Co., N. Y. City.
Weber Gas & Gasoline Eng. Co., Kansas City, Mo.

(Continued on page XIV.)

The United Mines Mining Company

is a corporation organized under the laws of the State of Delaware, with an authorized capital stock of \$400,000; par value \$1.00 per share; non-assessable and no personal liability of shareholders. Principal office at Wilmington, Delaware, with Delaware Charter Guarantee & Trust Co., and branch executive office at Santa Ana, Orange county, California. At par value 180,000 shares of this stock are issued for mines and oil lands, equipments and supplies. The balance, 220,000 shares, is being sold at par value for cash. Subscriptions for these shares (cash or money) can now be made and paid for at par, \$1.00 per share all down, or in advance installments of not less than 10% per month. The certificates are issued to subscribers as and when fully paid. The cash thus received will be used in the furtherance of the Company's interests and the prosecution of its business affairs. The properties will be rapidly and thoroughly developed and energetically operated so as to produce the best results for the shareholders. The production of gold, copper, lead and silver ores and oil, as well as any other business co-incident therewith will be vigorously handled. This is a good healthy enterprise with excellent propositions in hand for immediate operations.

REPORT.

There has been taken over by this company deeds and contracts in error, for the following mines and mining estates: Location, west of Manvel, San Bernardino county, California: The Old Shosh Mine, Red Bug Mining Claim, Harmony Claim, Bulls Eye Claim, Full Moon Claim, Meteor Claim, Colored Money Claim, and one-half of the Central Claim. All these are known as the Old Shosh Group of mines; and also have a full paid license for the use of U. S. Letters Patent, No. 650,000; a process patented for precipitating gold from water solutions: this is a valuable property and right. Also, three-fourths of the Lookout Claim, Little Giant Claim, one-half of the Jason Claim, and the Fellowship Claim; and one-tenth of the following claims: The Good Hope Mine, Horse Shoe Claim, Columbia Claim, Olympia Claim, Madoc Claim, Times Claim, Little My Claim, Midas Claim, and the Joe's Wonder Claim, and some others; all known as the Good Hope Group of mines. This makes about 100 acres of this valuable ground, as consolidated. This field shows good gold, silver, lead and copper assay values and many powerful vein outcroppings. Is a paying proposition, and with further development this is a large and valuable property. With the great bodies of mineral outcroppings, exten-

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O. S. BREESE, Vice-President, Los Angeles, Cal.
RAY BILLINGSLEY, Secretary and Treasurer, Santa Ana, Cal.

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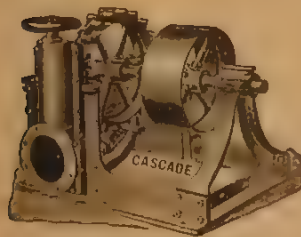
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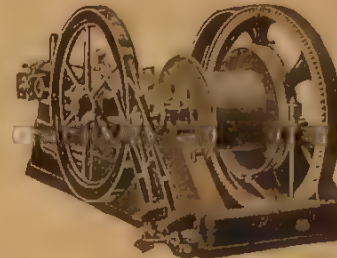
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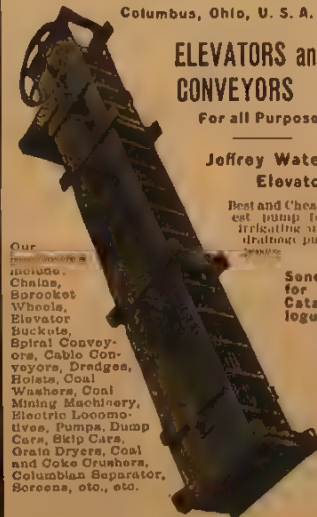
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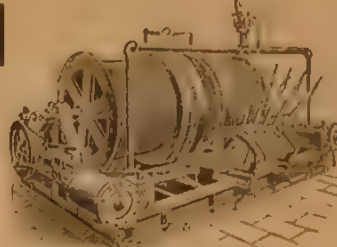
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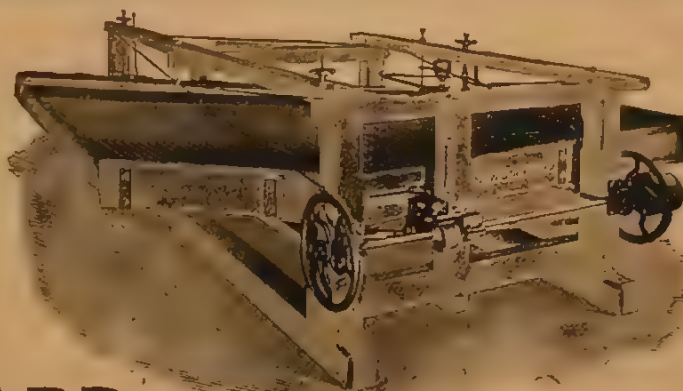
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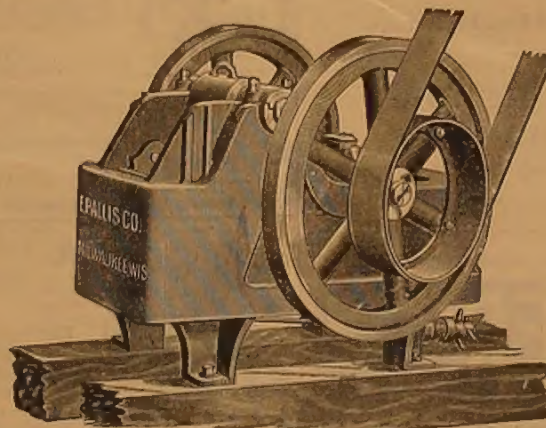
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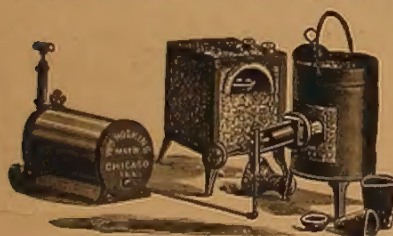
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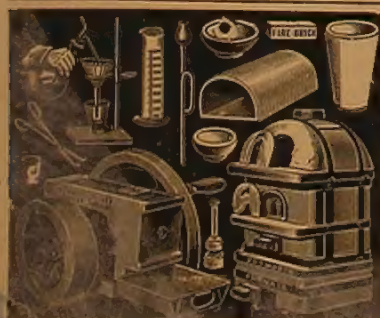
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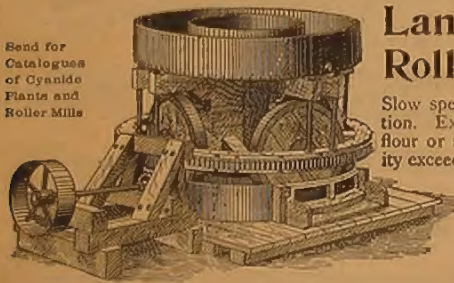
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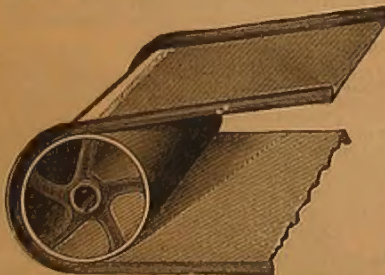


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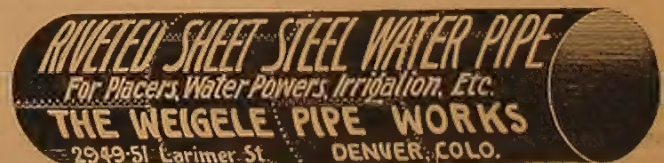
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